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AUTOMATED LAND AND MINERAL RECORD SYSTEM (ALMRS) ALTERNATIVES ANALYSIS

DECEMBER 1985

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AUTOMATED LAND AND MINERAL RECORD SYSTEM (ALMRS) ALTERNATIVES ANALYSIS

DECEMBER 1985

PREPARED FOR:

ALMRS PROJECT OFFICE
BUREAU OF LAND MANAGEMENT
U.S. DEPARTMENT OF THE INTERIOR

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PREFACE

The contents of this Technical Product apply to a unique BLM development effort and are not transferable to other environments. All questions regarding the contents of this document should be directed to the authors at the Federal Computer Performance Evaluation and Simulation Center, 6118 Franconia Road, Alexandria, VA 22310-2596.

In all three scenarios, the benefit/cost ratio is greater than one. The ratios are more favorable in the second and third scenarios, because benefits increase as the system is expanded to service more users and costs remain fixed across all scenarios. FEDSIM also analyzed cumulative benefits and costs to determine the breakeven point (i.e., payback year) for ALMRS. The payback year was determined to be year nine, eight, and seven, respectively, for scenarios one, two, and three.

FEDSIM also examined the following intangible benefits of ALMRS: improved accuracy and integrity of data; expanded management reporting capability; and shared use of BLM automated records by other Federal agencies, state and local governments, and private industry.

FEDSIM conducted sensitivity analyses on ALMRS life cycle cost estimates to determine what cost variations would result from varying factors in the following areas:

- Implementation schedule
- Graphics workloads
- Technology impacts

To analyze the effect of changes in the implementation schedule, FEDSIM examined the effect of reducing the implementation of ALMRS to all sites within selected states. If only the five high workload states are automated along with the DSC and Washington Office, life cycle costs decrease from $240.9 million to $145.6 million in the baseline case (implementation in all states). The inclusion of Eastern States in this partial implementation results in life cycle costs of $162.7 million. However, benefits are also significantly reduced in either of these partial implementations.

To analyze the effect of changes in the graphics workload, FEDSIM determined the number of graphics terminals and output devices required by increased and decreased workloads. FEDSIM determined that a 50 percent increase in the graphics workload over the projected baseline level would raise life cycle costs to $283.2 million, while a 50 percent decrease would reduce life cycle costs to $203.3 million.

To analyze the effect of advances in technology over the developmental phase of the ALMRS life cycle, FEDSIM conservatively estimated that continued reductions in the cost of technology over the next three to five years would result in a 20 percent reduction to all current ADP hardware costs. This estimate reduces the ALMRS life cycle cost to $226.9 million.

As a result of conducting the ALMRS Alternatives Analysis, FEDSIM concludes that:

- The development of the proposed ALMRS alternative is technically feasible.
- The most cost-effective alternative for ALMRS is a distributed configuration that places computers and disk storage at independently located area, district, and state offices and at DSC; and that connects Washington Headquarters to DSC with telecommunications.
- Automation of the ALMRS graphics and query functions appears to offer the highest payoffs.

In light of these conclusions, FEDSIM recommends that:

- BLM management evaluate ALMRS and determine whether to develop the system
- BLM demonstrate the feasibility of ALMRS by developing a prototype system
- Future development be directed toward the recommended distributed configuration
- DSC work with current system and potential ALMRS users to verify and refine ALMRS requirements and the alternatives analysis documented in this study
- BLM assign query functions and graphics capabilities the highest developmental priorities

ACKNOWLEDGEMENTS

FEDSIM acknowledges the efforts of Messrs. Brian Bernard, Bob Leopold, Dick Burkholder, Jerry Edler, Ken Fitzpatrick, Ellis Monash, and Dave Nelson, of Ms. Donna Webb, and of the entire ALMRS Project Office in providing FEDSIM with the information required to complete this document.

EXECUTIVE SUMMARY

This Technical Product documents the results of the Federal Computer Performance Evaluation and Simulation Center's (FEDSIM's) analysis of alternatives for developing and implementing the Automated Land and Mineral Record System (ALMRS) for the Department of the Interior Bureau of Land Management (BLM). FEDSIM conducted this analysis under Basic Agreement 84067-DOI.

ALMRS will be an automated system for supporting the BLM Lands and Minerals, and Records components of BLM. This document describes the current system supporting these components, lists functional requirements for ALMRS, and describes results of the alternatives analysis. This Technical Product was developed in accordance with guidelines prescribed in Federal Information Processing Standard Publication (FIPS PUB) 64, "Documentation of Computer Programs and Automated Data Systems for the Initiation Phase."

To identify ALMRS functional requirements, FEDSIM collected, reviewed, and analyzed information provided by the ALMRS Project Office. This information was obtained from interviews and meetings with the ALMRS Project Office staff and from ALMRS documents.

FEDSIM identified three categories of land and mineral records functions that BLM currently performs and that ALMRS must perform: (1) case processing (including graphics), (2) management reporting, and (3) query (including graphics). Of the three, the query function is estimated to have the greatest workload throughout a 12-year life cycle. ALMRS users include BLM management, BLM non-management, external users, and public users.

FEDSIM first conducted a Technology Survey to help identify and evaluate alternatives. FEDSIM and the ALMRS Project Office then identified major classes of alternatives. FEDSIM developed initial, high-level life cycle cost estimates for all identified alternatives and detailed cost estimates for the alternatives suitable for ALMRS. The ALMRS Project Office developed cost estimates for the current system and developed ALMRS benefits.

The most cost-effective alternative for ALMRS places computers and disk storage at the area, district, and state offices and at the Denver Service Center (DSC), and connects Washington Headquarters to DSC via a high speed digital line. This alternative (1) parallels the distribution of workload and responsibilities for land and mineral management, (2) eliminates transmission delays between ALMRS sites, (3) can be established based on currently available technologies, and (4) is consistent with BLM plans for implementing automated resource management.

FEDSIM also analyzed alternative sources for obtaining the ADP equipment required for ALMRS. A competitive procurement was determined to be the least costly approach that met all ALMRS requirements. This approach will be particularly advantageous for the acquisition of state-of-the-art spatial graphics capabilities.

To develop ALMRS cost estimates following FIPS PUB 64 guidance, FEDSIM defined the ALMRS life cycle and developed an ALMRS implementation schedule. FEDSIM assumed an ALMRS life cycle of 12 years to allow for seven years of full system operation after a five-year development period. The implementation schedule estimates ALMRS system design to be completed by the end of FY 1988. Most system acquisition expenditures (approximately 60 percent of the total) are scheduled to occur in FY 1990. Data collection will be completed by mid-FY 1991, and full operating capability will be available by mid-FY 1992.

FEDSIM developed cost factors in four major categories: system development, system configuration, communications, and operations. A 10 percent discount factor (as recommended in OMB Circular A-94) was applied to total system costs to compute present value. The total (undiscounted) cost of the proposed system was calculated to be $240.9 million.

Total quantifiable (undiscounted) ALMRS benefits over the 12-year life cycle were calculated to be $869.5 million. These benefits include:

- Personnel cost reductions and productivity improvements
- Cost avoidance of redundant data gathering activities for multiple BLM systems
- Cost avoidance of present data processing system operations and maintenance, and of cyclical plat restoration
- Cost recovery from initial data subscription and annual update sales of land and mineral data in alphanumeric and graphic form to other agencies and the private sector
- Increased cost recovery from sale of new or improved products (e.g., maps) made possible by new technology

Benefits of the ALMRS system accrue to three groups of users: (1) BLM, (2) other selected Federal entities, and (3) non-Federal entities. FEDSIM calculated benefit/cost ratios for the ALMRS system under three scenarios:

- Scenario 1 - Inclusion of only those benefits accruing to BLM
- Scenario 2 - Inclusion of only those benefits accruing to BLM and other selected Federal entities
- Scenario 3 - Inclusion of benefits accruing to BLM, other selected Federal entities, and non-Federal entities

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I. GENERAL INFORMATION

This section contains background information on the ALMRS Alternatives Analysis Project, outlines the organization of this report, discusses the DOI organizational environment in which this project was conducted, and presents a list of references used in preparing this document.

A. BACKGROUND

The Denver Service Center (DSC) of the Bureau of Land Management (BLM) of the Department of the Interior (DOI) is developing the Automated Land and Mineral Record System (ALMRS). ALMRS has evolved since April 1982, when the decision was made to automate the processing of oil and gas leasing case data as an aid to reducing the pending backlog of cases.

The first automated system was referred to as the Case Recordation System, which is currently operational and addresses some ALMRS requirements. However, because the Case Recordation System was developed quickly (55 days), it does not satisfy all requirements. For example, the system accommodates only 38 of the estimated 110 required data elements. ALMRS will replace the Case Recordation System, will attempt to satisfy all requirements, and will interface with other automated systems now operated by or planned by DOI.

From June 1982 to June 1984 BLM produced the following documentation for ALMRS:

- ALMRS System Description - June 1982
- Initiation Phase Documentation - August 1983
- ALMRS Program Description - March 1984
- User Requirements Document - May 1984
- Draft ALMRS Feasibility Study - June 1984

In June 1984, an internal BLM assessment of the ALMRS project questioned the validity of the Draft ALMRS Feasibility Study and noted that no alternatives had been analyzed. In response to this assessment, BLM initiated a project to conduct an alternatives analysis following guidelines provided in the Federal Information Processing Standards Publication Number 64 (FIPS PUB 64), "Guidelines for Documentation of Computer Programs and Automated Data Systems for the Initiation Phase."

In October 1984, BLM requested that the Federal Computer Performance Evaluation and Simulation Center (FEDSIM) develop and implement a plan for conducting an alternatives analysis. In the same month, BLM completed the "ALMRS Concept Document."

In December 1984, FEDSIM presented to BLM a draft of the plan for conducting the alternatives analysis. The draft plan indicated that ALMRS functional and automated requirements had to be developed before conducting the alternatives analysis. In response, BLM provided FEDSIM with the following two documents:

- Draft ALMRS Current Requirements Document - March 1985
- Draft ALMRS Future Requirements Document - March 1985

FEDSIM review of the these documents indicated that additional information was needed to fully identify ALMRS functional and automated requirements. In March 1985, BLM requested that FEDSIM complete the ALMRS functional and automated requirements and cost estimate documents. In June 1985, three draft documents were delivered to BLM for comment: Draft Functional Requirements, Draft Automated Requirements, and Draft Cost Estimates based on the Functional and Automated requirements.

In August 1985, BLM provided comments on the three draft documents produced in June 1985. At that time, it was decided that the functional and automated requirements documents would be combined into one document. In November 1985, FEDSIM incorporated BLM comments on the functional and automated requirements, and combined the documents into one document entitled the "Functional Requirements of the Automated Land and Minerals Record System."

BLM requested that FEDSIM parallel completion of the functional requirements for ALMRS with the alternatives analysis to the maximum extent possible. During July and August 1985, FEDSIM developed an outline of the Alternatives Analysis Document in FIPS PUBS 64 format. During August and September 1985, FEDSIM and BLM discussed and reviewed the content of the Alternatives Analysis. During September through December 1985, FEDSIM analyzed alternatives in parallel with completing the functional requirements for ALMRS. This FEDSIM Technical Product describes the results of the ALMRS Alternatives Analysis.

B. REPORT ORGANIZATION

This Technical Product is organized into nine sections. Section I provides general information about the project, including project background, the DOI environment, and references used in conducting this study. Section II is a Standalone Management Summary of the ALMRS Alternatives Analysis that expands the Executive Summary with sufficient details to support decision making by mid-level managers. Section III describes current system operations, requirements and associated problems. Section IV describes ALMRS requirements, including ALMRS functions and flows, users, data storage requirements, and performance requirements. Section V describes the proposed system and associated costs and benefits. Section VI describes all evaluated alternatives and their suitability for ALMRS. Section VII summarizes the costs and benefits of each suitable alternative, including estimates of net present values, benefit/cost ratios, and payback periods. Section VIII describes the Sensitivity Analyses performed to assess the impact of changes in the implementation schedule, graphics loading, CPU capacity and technology. Section IX describes the conclusions and recommendations that result from this Alternatives Analysis. Appendices A and B respectively provide details about the current system and ALMRS requirements. Appendices C and D provide details about the Alternatives Configurations, and Appendix E provides details about the Technology Survey performed to identify and evaluate alternatives. Appendix F provides details about ALMRS benefits.

C. ENVIRONMENT

This subsection discusses DOI organizational elements and the relationship of the mission of each BLM office type to ALMRS.

1. US Department of the Interior (DOI)

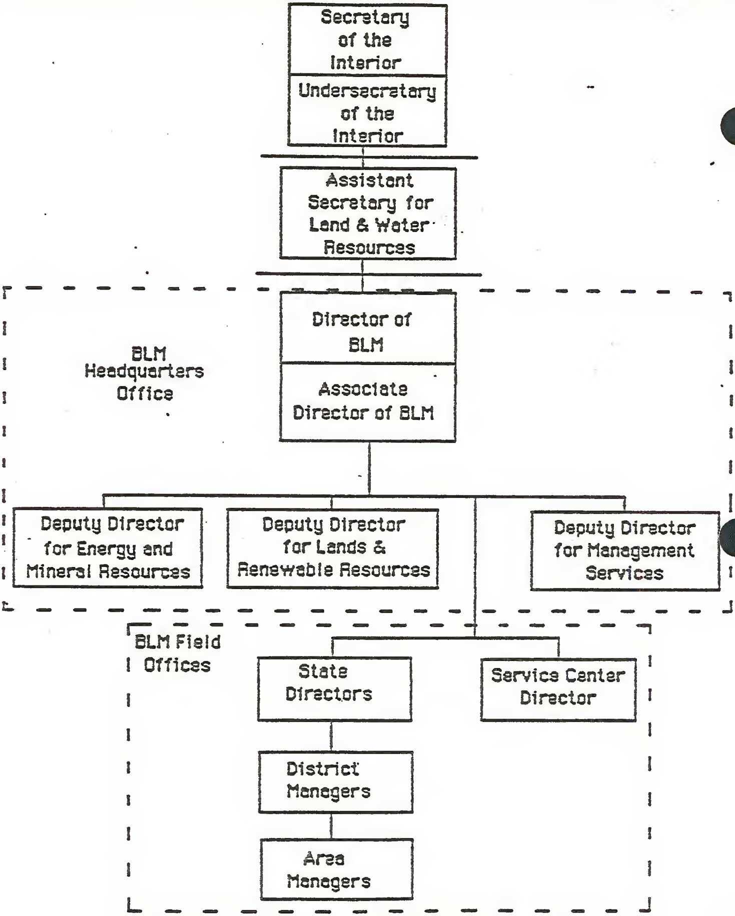
The DOI is responsible for managing most Federal lands and natural resources. The DOI organizational components relevant to ALMRS are summarized in Figure I-1. The DOI is headed by the Secretary of the Interior (SOI).

The DOI assigns responsibility for public lands and natural resources to Assistant Secretaries in the following functional areas:

- Land and Water Resources
- Fish, Wildlife and Parks
- Indian Affairs
- Policy, Budget and Administration
- Territorial and International Affairs

The duties of the SOI are discharged by Assistant Secretaries with authority and direct responsibility for programs associated with each of the above functional areas. Each Assistant Secretary reports directly to the Undersecretary of the Interior.

The Assistant Secretary for Land and Water Resources is responsible for programs associated with land use and water planning, public land management, development and management of water resource projects and facilities, and water resources functions. The Assistant Secretary for Land and Water Resources is also responsible for the Bureau of Land Management (BLM).


Secretary of the Interior
Undersecretary of the Interior
Assistant Secretary for Land & Water Resources
BLM Headquarters Office
Director of BLM
Associate Director of BLM
Deputy Director for Energy and Mineral Resources
Deputy Director for Lands & Renewable Resources
Deputy Director for Management Services
BLM Field Offices
State Directors
Service Center Director
District Managers
Area Managers

DOI ORGANIZATION ELEMENTS RELATED TO ALMRS

FIGURE I-1

2. Bureau of Land Management (BLM)

BLM is responsible for achieving balanced and effective use of 43 percent of all Federally owned land. BLM is headed by the Director of BLM (DOB), who reports directly to the Assistant Secretary for Land and Water Resources. BLM's organization consists of Headquarters in Washington, DC; a Service Center in Denver, Colorado; and Field Offices throughout the United States.

a. BLM Headquarters BLM Headquarters develops and interprets executive, legislative, and judicial policy for BLM programs and ensures that program responsibilities are being fulfilled. BLM Headquarters is headed by the DOB and the Associate DOB (ADOB). The ADOB reports to the DOB, assists the DOB, and assumes DOB responsibilities in cases of DOB absence. The DOB and ADOB assign responsibilities to three Deputy Directors for the following functional areas:

- Energy and Mineral Resources
- Land and Renewable Resources
- Management Services

BLM Headquarters plans to use ALMRS to support the management of land and mineral resources, to identify land use trends, to predict the impact of policy changes, and to provide information needed in making manpower and budget allocations.

b. The Denver Service Center (DSC) The Denver Service Center (DSC) provides consolidated administrative support to all BLM offices in such areas as payroll, accounting, and space management. DSC is also responsible for gathering, storing, and retrieving data about land and mineral resources and for developing new scientific and technological systems for use in BLM offices. The head of the DSC reports to the DOB.

The DSC has a Project Office responsible for developing and operating ALMRS. DSC will al so have users who will use ALMRS to streamline data maintenance procedures and to minimize the time required to organize land status data when developing technological concepts.

c. State Offices Each of 12 State Offices is headed by a State Director who reports to the DOB. Each State Office administers programs for planning, developing, and managing renewable and non-renewable resources. State Offices are also responsible for maintaining relations with the public within their assigned geographic area. Eleven of the 12 State Offices will use ALMRS data to make decisions about the use of land and mineral resources within their jurisdiction. The Alaska State Office is not included in the initial implementation of ALMRS. State Offices delegate responsibilities to District Offices.

d. District Offices There are 55 District Offices that report to State Offices and are responsible for administering resource management programs for land and mineral resources within their jurisdiction. Fifty-three of the 55 District Offices will use ALMRS data to support decisions about land-use. The District Offices that report to the Alaska State Office are not included in the initial implementation of ALMRS.

Each District Office has responsibility for a portion of the geographical area under the jurisdiction of the State Office.

District Offices are headed by a District Manager who reports to the State Director. District Offices delegate responsibilities to Resource Area Offices.

e. Area Offices There are 153 Resource Area Offices (called Area Offices) that carry out the day-to-day management of Federal lands. Area Offices are headed by an Area Manager who reports to the District Manager. Seventy-two of the 146 Area Offices are co-located with their District Office. One Area Office is co-located with a District Office to which it does not report. Current plans are for 146 of the Areas Offices to use ALMRS. Area Offices that report to the Alaska District and/or State Office are not included in the initial implementation of ALMRS.

3. Relationship to Other DOI Projects

ALMRS is being developed to provide detailed, legal land status information. ALMRS is related to two other DOI projects; (1) the Geographic Information System (GIS), and (2) the BLM Modernization Plan. The GIS is a joint project between the Fish and Wildlife Service, and BLM. GIS is being designed to provide general land resource information. The BLM Modernization Plan is a project where BLM is examining all of the ADP modernization planned and currently in progress in the Bureau. Both the GIS and BLM Modernization Plan are proceeding in parallel to ALMRS.

D. REFERENCES

This subsection lists, by category, the references used in preparing this document.

1. Project Request or Authorization

- FEDSIM Basic Agreement 84067-DOI
- Project Element Plan Number 2

2. Previously Published Documents

- ALMRS System Description - June 1982
- Known Hardware Configurations and Telecommunications Study - 1982
- Initiation Phase Documentation - August 1983
- ALMRS Program Description - March 1984
- User Requirements Document - May 1984
- Draft ALMRS Feasibility Study - June 1984
- ALMRS Present System Document - March 1985
- ALMRS Future System Document - March 1985
- ALMRS Equipment Analysis - March 1985
- ALMRS Requirements Document - September 1985
- Functional Requirements of the Automated Land and Minerals Record System, Volumes I and II - November 1985

3. Documentation Concerning Related Projects

- Geographic Information System Implementation Planning Report - June 1985
- Geographic Information System Concept Document

4. Other Reference Documents

- Federal Information Processing Standards Publication (FIPS PUB) No. 64
- Office of the Management of the Budget (OMB) Circular A-94
- DOI Departmental Manual Part 306 (Automated Data Processing) Chapter 4

5. Federal Regulations

- Federal Information Resources Management Regulation (FIRMR)

6. Other Sources of Information

- ATT Communications' Private Line Tariff No.s 9, 10, and 11 - April 1985
- *Software Engineering Economics*, by Barry W. Boehm

- Published Vendor Prices
- Computer Economics - February 1985
- Project Memoranda, Notes, and Working Papers referenced in the Functional Requirements of the Automated Land and Minerals Record System, Volume II - November 1985

II. MANAGEMENT SUMMARY OF THE ALMRS ALTERNATIVES ANALYSIS

This section is a standalone summary that expands the Executive Summary of the ALMRS Alternatives Analysis with sufficient information to support decision making by mid-level managers. This section is divided into seven subsections: (A) ALMRS Objectives; (B) Requirements; (C) Assumptions and Constraints; (D) Methodology; (E) Technology Survey; (F) Proposed System; and (G) Other Alternatives considered.

A. ALMRS OBJECTIVES

ALMRS is being developed to provide BLM with an efficient system for recording, maintaining, and retrieving land description, ownership, and use information in support of Federal programs and public users of such records. The objectives of ALMRS are to:

- Streamline responses to land and mineral inquiries
- Facilitate processing of applications and permits
- Improve access to ownership and use records
- Improve physical security of records, and protect proprietary and confidential information
- Ensure accuracy and consistency of data
- Improve the Bureau's planning, tracking, and evaluation of its programs
- Reduce costs of records management

B. OVERVIEW OF ALMRS REQUIREMENTS

ALMRS will automate many functions that require legal land status information and are now performed manually. ALMRS will attempt to resolve the following problems:

- Non-standardized forms and information flows
- Difficult research and access to information
- Existing backlog of cases with future growth anticipated
- Some required management information unavailable
- Difficulty in interstate coordination of data
- No existing backup of case information
- Deterioration of current records

This subsection describes the functions ALMRS must perform and the users, workload, data storage characteristics, and performance characteristics that ALMRS is required to support to resolve these problems.

1. Summary of ALMRS Functions

FEDSIM interviewed the ALMRS Project Office to clearly define the functions BLM currently performs which must be performed by ALMRS when fully operational. The interviews resulted in the functions summarized below.

a. Case Processing Functions. Case processing functions involve processing applications for land use and issuing authorizations to qualified applicants. Functions currently performed to process cases are: (1) application verification, (2) data retrieval, (3) land availability verification, (4) case tracking, (5) quality control check, and (6) authorization issuance. The case processing functions that require automation in ALMRS are: (1) application data capture, (2) application verification, (3) data retrieval, (4) alphanumeric land availability verification, (5) spatial graphics land availability verification, (6) case tracking, (7) quality control, and (8) authorization issuance.

b. Management Reporting Functions. Management reporting functions involve generating preformatted reports containing information about land description, ownership, and use for the DOI. Functions currently performed to develop management reports are: (1) data retrieval, and (2) report generation. The management reporting functions to be automated by ALMRS are: (1) request processing, (2) data retrieval, and (3) report generation.

c. Query Functions. Query functions involve responding to ad hoc requests from ALMRS users for accurate land status, financial, and applicant data. Functions currently performed to respond to queries are: (1) data retrieval, and (2) response generation. Functions to be automated by ALMRS are: (1) request processing, (2) alphanumeric data retrieval, (3) alphanumeric responses to requests, (4) spatial graphics data retrieval, and (5) spatial graphics responses to requests.

2. ALMRS Users

FEDSIM interviewed the ALMRS Project Office to define ALMRS users. The results of the interviews indicated that there will be four classes of ALMRS users: (1) BLM management users, (2) BLM non-management users, (3) external users, and (4) public users. BLM management and non-management users will use the system for all system functions; case processing, management reporting, and query. The external and public users will use the system only for the query function. ALMRS will have a total of 3,026 non-management users and 276 management users. When converted to the full time equivalents, there will be 2,219 non-management users and 49 management users. The number of external and public users is not known, but the workload associated from these users has been estimated.

3. ALMRS Workload

FEDSIM defined ALMRS workload by estimating the volume of transactions for each ALMRS function. FEDSIM estimated the volume of transactions from the ALMRS Project Office estimates of the maximum volume of transactions in Fiscal Year (FY) 1985 and estimated increase of 3.5 percent per year compounded during the 12-year ALMRS life cycle.

The FY 1997 workload, the last year of the 12-year life cycle, shows that the query function will handle the most transactions for the ALMRS system. The query function is estimated to produce approximately 160,000 transactions of an average 40,000 characters per output. The case processing function is estimated to produce approximately 23,000 transactions of an average 43,000 characters per output. The management reporting function is estimated to produce approximately 6,000 transactions at 7,500 characters per output. Since the query function was estimated to produce a workload much larger than the other functions, the query function was the primary element used to size ALMRS.

4. ALMRS Data Storage Requirements

BLM provided FEDSIM with estimates of the amount of manual and automated data ALMRS must store. The manual storage requirements for FY 1997 are estimated at approximately 55,000 cubic feet which is (50 percent of the FY 1985 manual storage requirements).

The automated storage is dependent upon the technique used for graphics storage. If BLM chooses to implement ALMRS using the state-of-the-art technique of unstructured (calculated) graphics, the automated data storage requirements will be less than one half of the data storage requirements for the more conventional prestructured graphics. The unstructured graphics capability, combined with the alphanumeric requirement, requires 580 gigabytes of automated data storage. The prestructured graphics capability, as used in the GIS MOSS system, requires approximately 1,300 gigabytes of automated data storage when combined with the alphanumeric storage requirements.

5. ALMRS Performance Requirements

FEDSIM interviewed the ALMRS Project Office to obtain information about ALMRS Performance requirements, which include turnaround time, reliability, and maintainability requirements. BLM requires that not more than 10 minutes pass before any of its query and case processing functions are completed. An average turnaround time of one to five minutes is desired. ALMRS reliability and maintainability requirements include: operational reliability; logging; journalizing; checkpointing; and preventative and corrective maintenance.

C. ASSUMPTIONS AND CONSTRAINTS

1. Assumptions

a. Information Provided by the ALMRS Project Office Accurately Reflects User Requirements. The ALMRS Project Office of DSC originally requested that FEDSIM conduct an alternatives analysis. Prior to conducting the alternatives analysis, FEDSIM determined that the ALMRS functional and automated requirements must be defined and documented. The ALMRS Project Office instructed FEDSIM not to survey users to collect the information needed to define requirements; instead, the ALMRS Project Office provided FEDSIM with information describing the requirements based upon the staff's significant involvement over several years. FEDSIM organized the information provided by DSC and prepared this document. FEDSIM assumes that the information provided by the ALMRS Project Office accurately reflects user requirements.

b. ALMRS Twelve-Year Life Cycle. FEDSIM assumes that ALMRS will have a 12-year life cycle and that the ALMRS workload will grow at a rate of 3.5 percent per year compounded in each of the twelve years. This applies to all functions except the Management Reporting function, work for which is expected t remain constant.

c. ALMRS Project Office Will Validate the Completeness and Accuracy of the Information in this Document. FEDSIM assumes that the information provided by ALMRS Project Office is complete and accurate, and that the ALMRS Project Office will validate the information contained in this document.

d. Unstructured Graphics Technology Now Being Developed is Feasible for ALMRS. To size graphics data storage requirements, FEDSIM assumed that the unstructured graphics technology being independently developed by Florida State University, certain vendors of graphics workstations, and BLM will be available for ALMRS. This technology involves constructing spatial graphics products from a combination of alphanumeric and prestructured graphics data. If this technology does not advance rapidly enough, or if it does not prove workable for ALMRS in prototype systems, the information pertaining to graphics storage will need to be re-evaluated. This assumption does not affect other aspects of the ALMRS Alternatives Analysis.

2. Constraint

The Forest Service of the U.S. Department of Agriculture is currently considered a selected external ALMRS user located at eight Regional Offices and two Washington Office Headquarters locations. However, Congress is evaluating a proposal for making

BLM and the Forest Service interchange, or swap, lands to provide more efficient management and eliminate duplication of effort. If Congress approves the proposal before ALMRS is automated, 300-500 Forest Service Forest Supervisor and Ranger District offices may have to be added to the list of internal ALMRS users, and their requirements will have to be integrated into ALMRS. The initial ALMRS implementation plan provides selected Federal external users, including the Forest Service, a capability to access ALMRS alphanumeric data and certain software via dial-up lines.

D. METHODOLOGY

This section describes the methodology used to conduct this project. The format and guidelines followed in this project are described in detail in a document entitled "Guidelines for Documentation in the Initiation Phase," published by the National Bureau of Standards as Federal Information Processing Standard Publication (FIPS PUB) No. 64.

1. Orientation

FEDSIM visited the Denver Service Center and met with the ALMRS Project Office , visited state and area offices in the Denver, CO. area, and reviewed the existing ALMRS documentation. FEDSIM also reviewed manuals and organization charts to become familiar with ALMRS and with DOI, BLM, and DSC missions and goals.

2. Definition of Current System Requirements

To define the current system requirements, FEDSIM reviewed and analyzed documents provided by the ALMRS Project Office, developed questionnaires, worked with DSC to collect information, and met frequently with the ALMRS Project Staff. FEDSIM analyzed and categorized the current system's operations, functions, users, data, workload, interfaces to external systems, and performance requirements.

3. Development of Problem Description

To develop the problem description, FEDSIM met with the ALMRS Project Office, and reviewed and analyzed documentation to identify problems with the current system. These problems were verified and expanded by the ALMRS Project Staff in subsequent meetings.

4. Definition of ALMRS Requirements

FEDSIM worked with BLM to define ALMRS requirements by evaluating problems with the current system, identifying potential automated functions, conducting research into the feasibility of automation, and projecting workload to FY 1997. FEDSIM identified the numbers and categories of users, data, data storage requirements, and interfaces to current and proposed systems.

5. Development of Draft Functional and Automated Requirements Documents

FEDSIM prepared two documents that contained the current system functional requirements and the ALMRS requirements. FEDSIM briefed BLM on the contents of these documents and requested that BLM review and verify the information therein.

6. Review and Verification of Draft Documents

The ALMRS Project Office reviewed the documents and provided comments to FEDSIM. The ALMRS project staff also verified the requirements by meeting with potential ALMRS users and managers at Area, District, State, BLM, and DOI offices.

7. Compilation of Final Functional Requirements Document

FEDSIM incorporated the information contained in Functional Requirements and Automated Requirements documents, modifications and new information that resulted from the verification meetings, and ALMRS Project Office comments into the Functional Requirements Document.

8. Identification of Major Classes of Alternatives

FEDSIM and the ALMRS Project Office defined several alternatives during meetings. FEDSIM verified that these alternatives conformed with those required by the FIRMR and DOI regulations.

9. Initial Costing of Alternatives

FEDSIM developed high level, life cycle cost estimates for alternatives suitable for ALMRS using the methodology presented in FIPS PUB 64. The initial costing of alternatives used an eight year life cycle and a 3.5 percent per year compounded growth rate.

10. Initial Costing of Current System

The ALMRS Project Office developed the initial costs for the current system by interviewing BLM system cost personnel and reviewing existing system documentation.

11. Identification of Benefits

The ALMRS Project Office developed the ALMRS benefits by interviewing potential users, reviewing system documentation, reviewing existing personnel and equipment costs, and calculating system savings.

12. Refinement of All Costs and Benefits

FEDSIM refined the costs developed during the initial costing by increasing the level of detail to include each individual office's requirements. The life cycle was increased to twelve years to allow a reasonable operational period after the five year development period. The ALMRS Project Office refined the benefits by revising the personnel costs, and increasing the level of detail.

13. Review of Interim Working Papers

FEDSIM and the ALMRS Project Office reviewed working papers frequently and met to review comments, verify content, and update documents with the most recent cost or benefit figures.

14. Compilation of Alternatives Analysis Document

FEDSIM compiled the final Alternatives Analysis Document by combining the Functional Requirements of the Automated Land and Minerals Records System and BLM and FEDSIM's working papers. FEDSIM then integrated the above into this Alternatives Analysis Document.

E. TECHNOLOGY SURVEY

As part of the process of conducting the ALMRS Alternatives Analysis, FEDSIM conducted a technology survey. The objectives of this survey were to:

- Determine if the technology exists to provide a cost effective solution to ALMRS requirements;

- Establish the per unit expenditures for Automated Data Processing (ADP) and telecommunications components included in the life cycle cost analysis;

- Develop estimates of how forecasted changes in technology will affect ALMRS life cycle costs.

The results of the technology survey showed that all hardware required for ALMRS exists and is available from various vendors, and the telecommunications required for a centralized system does not exist. FEDSIM surveyed the ADP market for many devices (Central Processing Unit, storage, alphanumeric terminals, graphic terminals/workstations, and management terminals [personal computers]) and found that they are generally available from many vendors. This situation should assure a large discount to be used by the vendors in response to BLM's procurement. When FEDSIM surveyed the existing telecommunications capabilities, even American Telephone and Telegraph (AT&T) (the largest and most widely spread long distance lines carrier), could not support high speed lines to all of BLM's independent locations. A centralized system would therefore require very expensive satellite communications as the only alternative.

F. PROPOSED SYSTEM AND OTHER RECOMMENDATIONS

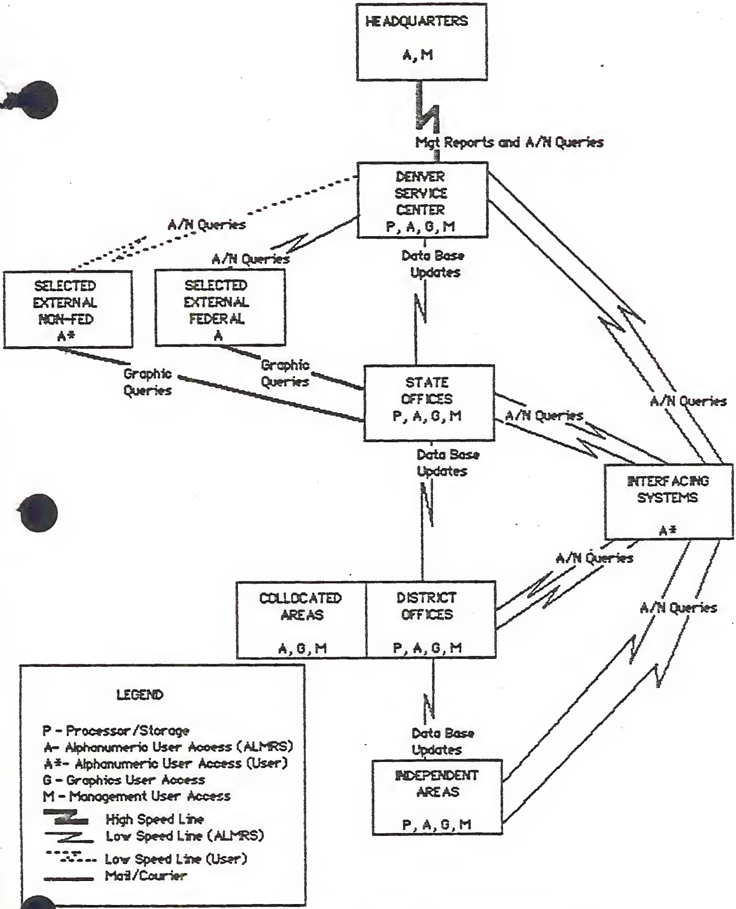
FEDSIM recommends an ALMRS system based on a distributed configuration using hardware purchased through a competitive procurement process. The software development effort includes research and development and prototype activities to provide state-of-the-art spatial graphics data processing to meet land and mineral records requirements. This approach will minimize data storage by computing topological relationships and by employing other data compression techniques.

Figure II-1 shows the proposed ALMRS system configuration. This distributed system will have processors and disk storage located at 136 sites: The Denver Service Center (DSC), 11 state offices, 53 district offices, and 71 area offices that are not collocated with other offices. Collocated area offices will use the processor/storage capabilities of the parent office. All offices will have alphanumeric access devices (terminals, printers), graphics access devices (terminals, plotters, hardcopy, digitizers), and management access devices (personal computers). Each independent area, district, and state office will be connected to the site above and below it in the organizational hierarchy.

A high capacity dedicated line will connect the Washington Office to the DSC. Each of the 136 sites will also have one incoming and one outgoing dial-up line for exchanging data with interfacing systems.

The proposed system is estimated to cost approximately $140 million in present value dollars. Because some of the assumptions used to estimate the proposed system did not include all implementation strategies or hard data, a sensitivity analysis was conducted to incorporate other strategies and data variances. The costs of the different sensitivities conducted are expressed here as a variation of the base cost of the proposed system.

For the first sensitivity analysis, FEDSIM selected to install ALMRS only at all sites within selected key states. The selected key states are the five largest oil producing states under BLM jurisdiction that BLM refers to as the "OPEC" states (Wyoming, New Mexico, Montana, Utah, and Colorado). The resulting cost of this alternative is $85 million present value dollars. When Eastern States is added to the list of states to be automated, the resulting cost is $96 million present value dollars. Because of the required system development costs, the costs do not decrease in a linear fashion as the number of sites to be implemented decrease. The benefits do decrease in a linear fashion as the sites are decreased. Thus, benefit cost comparisons are less favorable in the uneven implementation options than in the proposed system with full implementation.



PROPOSED ALMRS SYSTEM CONFIGURATION
FIGURE II-1

FEDSIM examined the impact of varying the graphics workload volumes because graphics terminals are a significant component of the system cost estimates. When the workload was increased by 50 percent, the resulting system costs increased to $163 million present value dollars. When the workload was decreased by 50 percent, the resulting system costs decreased to $120 million present value dollars. There are no benefit impacts associated with this case.

FEDSIM increased the size of the CPU's required to process ALMRS in the event that the originally sized CPU's were inadequate. The total present value costs are increased to $150 million. There are no benefit impacts associated with this case.

FEDSIM examined its original conservative assumption of current marketplace costs for ADP hardware by allowing for a 20 percent reduction in the ADP hardware due to technology advances. The total present value costs are decreased to $132 million. There are no benefit impacts associated with this case.

G. OTHER ALTERNATIVES CONSIDERED

Regulations published by the General Services Administration (GSA) and resulting orders implemented by DOI require that a range of alternatives be evaluated prior to selecting a proposed system. FEDSIM translated the general options into the following specific alternatives:

- Continued use of the existing land and minerals records system. Although included in the study is a costing of this alternative, it is not considered a viable one.

- Use of excess ADP equipment from the GSA Availability List. Results of the study have shown this alternative to be unsuitable due to the type of items appearing on the GSA Availability List. There is no costing for this alternative in the study.

- Use of commercial timesharing. Results of the study have shown this alternative to be unsuitable due to the increased cost of the telecommunications necessary for the centralized processing offered by commercial timesharing vendors. Furthermore, a TSP vendor cannot guarantee the recommended eight year operational life cycle since their agreements are generally only for a three year period.

- Shared use of existing Honeywell based equipment at the DSC and state offices. This alternative consists of two different sub-alternatives: (1) a centralized configuration, and (2) a state-level distributed configuration. Neither of these alternatives are feasible for ALMRS. They both lack the resources necessary for the full implementation of ALMRS. Because this alternative falls short of what is necessary for ALMRS requirements, this study does not address its costs.

- Shared use of planned equipment being obtained under the Fish and Wildlife Service/Bureau of Land Management (FWS/BLM) procurement for Geographic Information System (GIS) hardware. This alternative falls short of the ALMRS requirements because none of ALMRS requirements were taken into consideration when the RFP was developed. Because the study found the alternative unsuitable, this alternative was not costed.

- Acquisition/traditional software development using the existing Map Overlay and Statistical System (MOSS) and planned GIS "technology package" as a starting point. This alternative was found to be suitable but more costly than the preferred approach. The study addresses a life-cycle cost on this alternative.

III. CURRENT SYSTEM

This section is divided into three subsections: (A) Current Operations, (B) Current System Requirements, and (C) Problem Description. This section summarizes the information about the current system workload detailed in Appendix A.

A. CURRENT OPERATIONS

Figure III-1 is an entity diagram of the current Land and Minerals Records system. Entity diagrams present the basic elements of a system and how they functionally interact. The entity nodes (or "bubbles") of Figure III-1 contain the entities of the current system. Arcs (or lines) depict the functional interactions and objectives of the current system, and arrow-heads indicate the direction of information flow between entities.

1. Current System Entities

The current system consists of manual and automated procedures that BLM uses to process land and mineral information. The current system consists of the following entities: BLM offices; public users; external users; BLM Headquarters and the DSC; the BLM Mining Claims and Case Recordation Systems; external systems and organizations; and BLM adjudication and field personnel.

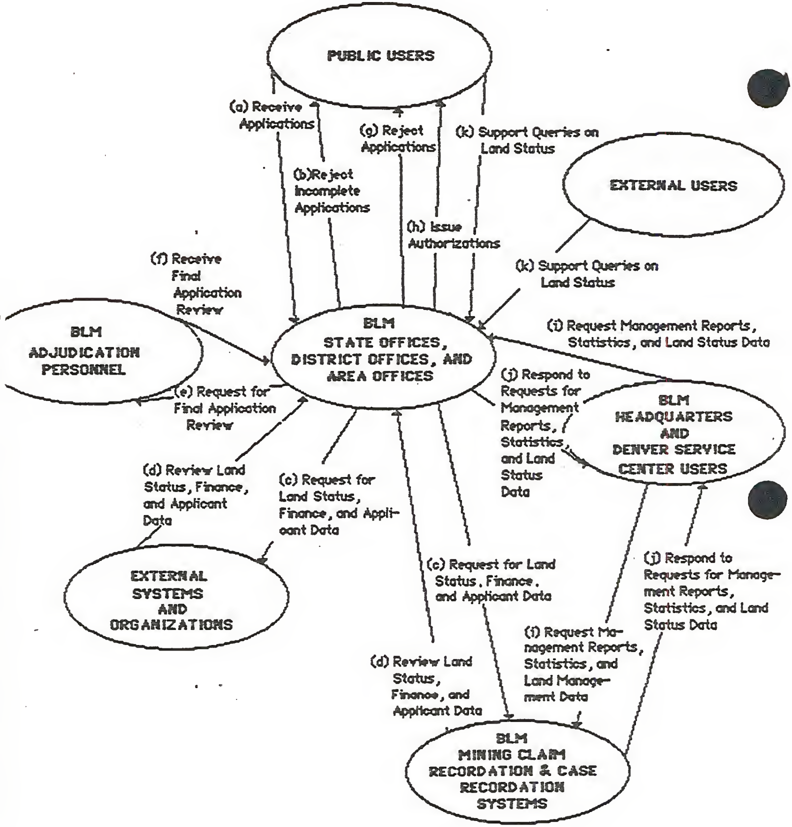
a. BLM Offices. BLM offices have public access rooms located in State, District, and Area Offices. The rooms provide public access to case files; cadastral survey plats; images of title documents, patents, deeds, and other legal documents; status plats; tract books; and other historical information. Public Users include private companies and citizens located throughout the United States.

b. External Users. External users include offices of the Forest Service, Mineral Management Service, Geologic Survey, Office of Surface Mining, Bureau of Indian Affairs, and selected state and local governments located throughout the United States.

c. BLM Headquarters and DSC. The "BLM Headquarters and DSC User" entity consists of BLM Headquarters and DSC personnel located at BLM Headquarters and the DSC.

d. Mining Claims Recordation and Case Recordation Systems. The BLM Mining Claims Recordation and Case Recordation Systems are automated systems located at the DSC and state offices that are used to process data from lands and minerals cases.

e. External Systems. The "External Systems and Organizations" entity consists of the systems and organizations that are not directly involved in the processing


PUBLIC USERS
(a) Receive Applications
(b) Reject Incomplete Applications
(g) Reject Applications
(h) Issue Authorizations
(k) Support Queries on Land Status
EXTERNAL USERS
(k) Support Queries on Land Status
(f) Receive Final Application Review
BLM ADJUDICATION PERSONNEL
BLM STATE OFFICES, DISTRICT OFFICES, AND AREA OFFICES
(i) Request Management Reports, Statistics, and Land Status Data
(e) Request for Final Application Review
(j) Respond to Requests for Management Reports, Statistics, and Land Status Data
BLM HEADQUARTERS AND DENVER SERVICE CENTER USERS
(d) Review Land Status, Finance, and Applicant Data
(c) Request for Land Status, Finance, and Applicant Data
EXTERNAL SYSTEMS AND ORGANIZATIONS
(c) Request for Land Status, Finance, and Applicant Data
(j) Respond to Requests for Management Reports, Statistics, and Land Status Data
(i) Request Management Reports, Statistics, and Land Management Data
(d) Review Land Status, Finance, and Applicant Data
BLM MINING CLAIM RECORDATION & CASE RECORDATION SYSTEMS

CURRENT SYSTEM ENTITY DIAGRAM

FIGURE III-1

of cases but require or provide information used to complete case processing. For example, information involved with the National Environmental Policy Act (NEPA) compliance process and with appeals hearings on rejected cases fall into this category. External systems and organizations are located throughout the United States.

f. BLM adjudication personnel. BLM adjudication personnel are located in State, District, and Area Offices. They make recommendations to management and issue decisions about land and mineral cases.

2. Current Procedures

The current procedures involved in Lands and Minerals and Records processing are divided into eleven objectives discussed below.

a. Receive Applications. Private individuals and companies in the private sector, certain sections of BLM, and organizations in the public sector submit applications for use of Federal land and resources, including: mining claims, rights-of-way, oil and gas leases, mineral leases, and grazing rights. Applications are submitted to BLM personnel on forms that the applicant completes. Forms are not currently standardized, but all forms collect data to identify the applicant, the proposed use of the land, and other data relevant to consideration of the application. This is shown as arc (a) on Figure III-1.

b. Reject Incomplete Applications. BLM case processing personnel review the applications to verify that it is complete. BLM case processing personnel return incomplete applications to the applicant. This is shown as arc (b) on Figure III-1.

c. Request Land Status, Finance, and Applicant Data. After BLM case processing personnel determine that the application is complete, they refer to the application as a case, assign a serial number to the case, and establish a case file. The case file contains all working and historical records of the case being processed. The case file, which is maintained manually, also contains data about the actual use of the land after use is authorized, i.e., after the application has been completely processed. To process cases, BLM personnel verify that land is federally-owned, that the applicant is financially and legally qualified, and that land is available for the purpose requested on the application. BLM personnel obtain other data needed such as survey plats and historical documents to process cases from their office files. If required, they request additional data from the BLM Case Recordation and Mining Claim Recordation Systems, and from other external systems and external organizations. This is shown as arcs (c) on Figure III-1.

d. Review Land Status, Finance, and Applicant Data. BLM personnel review land status, finance, and applicant data they collect to verify land ownership, applicant qualifications, and land availability for the purpose proposed in each case. This is shown as arcs (d) on Figure III-1.

e. Request Final Application Review. After verification of land availability, BLM personnel forward the case information to BLM adjudication personnel to perform final application review to verify land ownership, applicant qualifications, and land availability for the purpose proposed in each case. The adjudicators also decide whether to reject the application or issue an authorization for use of the federal land. This is shown as arc (e) on Figure III-1.

f. Receive Final Application Review. BLM personnel receive the results of the final application review from the adjudicators. This is shown as arc (f) on Figure III-1.

g. Reject Applications. The application can be rejected at any time during case processing. Applications are rejected when BLM adjudication personnel determine that there is no federal interest in the land, that the land is not federally-owned, that the proposed use of the land is not possible, or that the individual is not qualified. When the application is rejected, the applicant receives a notification with an explanation of the rejection. This is shown as arc (g) on Figure III-1.

h. Issue Authorizations. If BLM adjudication personnel approve the application during final application review, BLM adjudication personnel issue a legal document to the applicant authorizing use of the land for the purpose proposed in their application. The authorization may be further limited by stipulations or regulations listed on the document. This is shown as arc (h) on Figure III-1.

i. Request Management Reports, Statistics, and Land Status Data. BLM headquarters, DSC, and other organizations request management reports, statistics, case processing status reports, and/or data on application, applicant, land-use, or land-status from BLM offices. This is shown as arcs (i) on Figure III-1.

j. Respond to Requests for Management Reports, Statistics, and Land Status Data. BLM personnel use information from the BLM Mining Claim Recordation System, from the Case Recordation System, and from their manual files to develop reports to respond to BLM Headquarters and DSC requests for data and management reports. This is shown as arcs (j) on Figure III-1.

k. Support Queries on Land Status Data. Public and external users require information on land attributes such as land ownership, resources, physical descriptions, stipulations, rights-of-ways, or legal claims. Public users require this information when completing an application for land use, using an authorization after a case is processed, conducting legal research, and conducting historical research for private interests. External users require this information to exercise their land management responsibilities. BLM public room personnel assist public and external users by conducting research and responding to requests for survey plats, control document indices, and other reference information. This is shown as arcs (k) on Figure III-1.

3. Description of Existing ADPE

BLM currently operates automated data processing equipment (ADPE) supporting the Mining Claim Recordation and Case Recordation Systems. This ADPE consists of a mainframe located at DSC, minicomputers located at State Offices, and terminals and printers located at District and Area Offices. DSC operates a Honeywell Information System (HIS) DPS 8/70 mainframe with 1.3 Gigabytes (Gb) of on-line disk storage operating under the GCOS operating system. Data communications for the DPS 8/70 are handled by four front end processors (FEPs), each of which is capable of supporting 32 ports. There are 37 hard-wired terminals, 31 dial-in terminals, and thirteen 96-character printers. Seventeen percent of HIS DPS 8/70 storage is available for additional work.

State Offices and DSC access the DPS 8/70 primarily via HIS Level 6 minicomputers. They may also directly access the DPS 8/70 via terminals. The State Offices' HIS Level 6 minicomputers access the DPS 8/70 over the Wide Area Telecommunications System (WATS). Table III-1 presents the HIS Level 6 configuration of each State Office and DSC. Twenty percent of all HIS Level 6 storage is available for additional work. The information in this table was derived from the list of ADP equipment by state in BLM's "Current Requirements Document."

District Offices and Area Offices use computer terminals to access the DPS 8/70 remotely via their assigned State Office's HIS Level 6. If the assigned State Office's Level 6 is not accessible, District and Area Offices access the DPS 8/70 directly. Table A-1 in Appendix A presents the number of terminals and printers available at District and Area offices as of February, 1985. Table A-1 denotes District Offices by "DO." Area Offices are denoted by "RA" and are listed below their corresponding District Office. The printers currently located at District Offices are 96-character printers.

BLM has additional ADPE that support applications other than those of the Mining Claims Recordation or the Case Recordation Systems. Examples of these other systems are the Data General MV/8000 operated by DSC and the Data General C/330's operated by the Wyoming, New Mexico, Oregon, and California State Offices.

STATE OFFICE	LEVEL 6 MODEL NO.	MB MEMORY	NO. OF 256MB STORAGE DEVICES	COMMUNICATIONS TYPE	NO. PORTS
DSC[1]	57	1.9	2	Asynchronous Synchronous HDLC	68
Arizona	57	2.0	2	Synchronous	42
California	47	1.8	2	Asynchronous Synchronous HDLC	43
Colorado	47	1.8	2	Asynchronous Synchronous HDLC	43
Eastern States	47	1.8	2	Asynchronous Synchronous HDLC	39
Idaho	47	1.8	2	Asynchronous Synchronous HDLC	47
Montana	47	2.0	2	Asynchronous Synchronous HDLC	46
Nevada	47	1.7	2	Asynchronous Synchronous HDLC	31
New Mexico	47	1.5	2	Asynchronous Synchronous HDLC	30
Oregon	57	1.5	2	Asynchronous Synchronous HDLC	31
Utah	47	2.3	2	Asynchronous Synchronous HDLC	35
Wyoming	57	1.8	2	Asynchronous Synchronous HDLC	44

[1] LINE OFFICE - NOT A STATE OFFICE

CURRENT STATE OFFICE HIS LEVEL 6 CONFIGURATIONS

TABLE III-1

B. CURRENT SYSTEM

This subsection describes current system information functions and flows, users of the current system, current volumes of work, current data storage requirements, and current performance requirements.

1. Information Functions and Flows

This subsection describes the current functions that are performed. They are derived from the activities identified in the entity diagram shown as Figure III-1 in Section V.A.1.

a. Overview of Current System Functions. The current system serves the following five functions: recording, maintaining, and retrieving land status, finance, and applicant data; processing cases, pre- and post-authorizations, and tracking of cases; responding to management queries; responding to requests for reports and statistics; and supporting public research. These functions are organized into three categories of current system requirements: case processing, management reporting, and query, as depicted in Figure III-2.

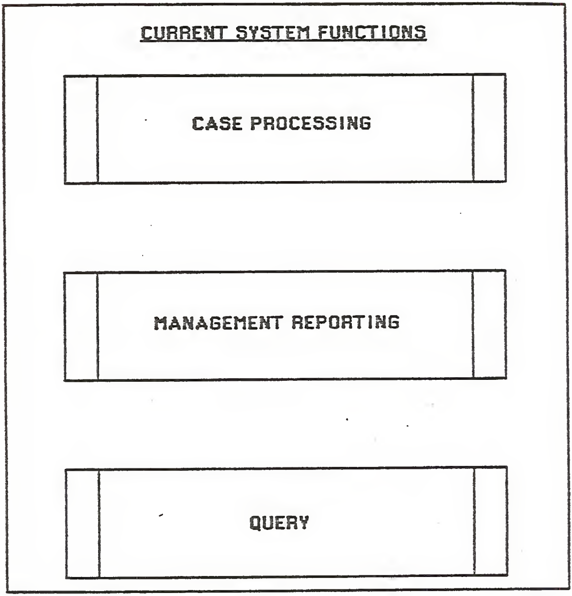
Case processing consists of verifying the completeness of applications for land use, determining land availability and suitability for the purpose proposed by the application (case), tracking the processing of cases, issuing authorizations for land use, issuing rejections for land use, rejecting applications if the land is not available for the proposed purpose or if the applicant is not qualified, and tracking land use after issuance of the authorization.

Management reporting and statistics consists of preparing preformatted reports containing accurate information on cases and on uses of land and resources, and other information required to manage cases and land use.

Query consists of responding to ad hoc requests for case data and data about land and land use.

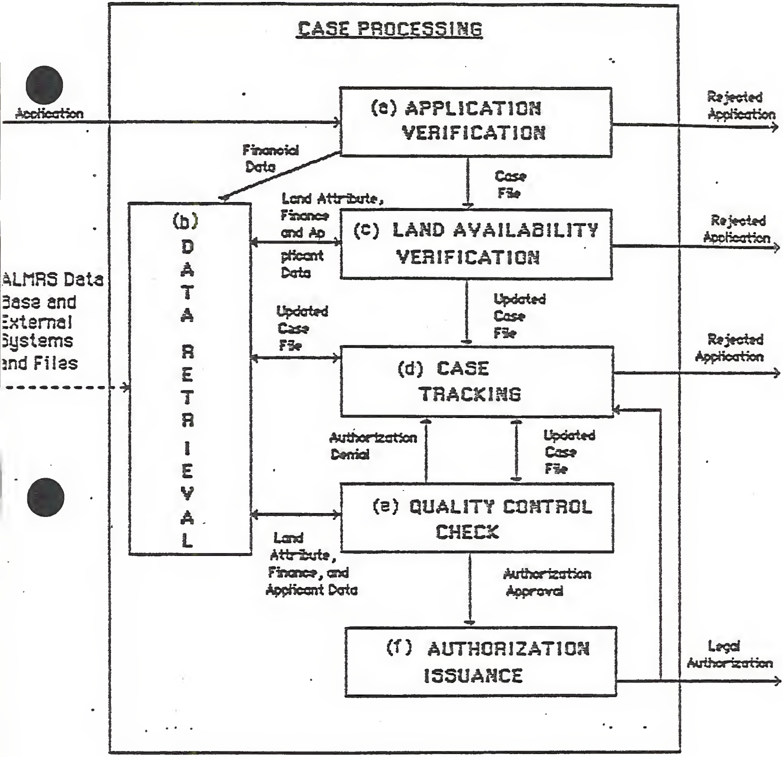
b. Case Processing Tasks. Case processing consists of six tasks: application verification, data retrieval, land availability and suitability verification (including field work), case tracking, quality control check, and authorization issuance. Figure III-3 is an information flow diagram depicting the flow of information between tasks. The rectangles of Figure III-3 represent the tasks, and the arrows represent the information flowing into and out of each task. The inputs, processing, and outputs of each task are discussed below.

(1) Application Verification Task. Individuals and companies of the private sector, BLM, and organizations of the public sector submit case applications for



SUMMARY OF CURRENT SYSTEM REQUIREMENTS

FIGURE III-2



CASE PROCESSING TASKS
INFORMATION FLOW DIAGRAM

FIGURE III-3

verification of data contained thereon. A serial number is acquired through the data retrieval subfunction (See Subsection III.B.1.b.2). Incoming applications are reviewed to determine that appropriate portions of the application have been properly completed.

The application verification task (block a in Figure III-3) produces the following outputs: rejected applications; requests for serial number data; case files; and financial data. Applications are rejected if they are incomplete or incorrect. Rejection involves returning the applications to the applicant with an explanation of the reason for rejection.

If the application has been appropriately completed, the application verification function: (1) issues a request for a serial number, (2) establishes a case file, (3) assigns a serial number to the case, and (4) submits the case file for further processing to verify land availability. If financial data are contained in the application, the application verification function extracts and submits the financial data to the appropriate files through the data retrieval task.

(2) Data Retrieval Task. All case processing tasks submit data to and request data from the current system data base through the data retrieval task (block b in Figure III-3). For example, the application verification task submits a request for a serial number and submits financial data extracted from the application to financial files through the data retrieval task. The land availability verification and quality control check tasks submit requests for: (1) land status attributes; (2) stipulations data; (3) financial conditions of cases; (4) applicant qualifications; and (5) other data through the data retrieval task. The case tracking task submits data that results from updating case files and requests data from sources such as the National Environmental Protection Agency (NEPA) compliance process, case appeals files, and the Financial Management System files. The data retrieval task is presented here as a single point source of information even though it is currently a collection of automated and manual processes in several locations.

The data retrieval task receives requests for data from other tasks and from other systems, searches the current system data bases, retrieves data to respond to the requests, and maintains data that references data in manually maintained files. The files that are currently automated are those contained in the Mining Claims Recordation and Case Recordation Systems. The files and documents that are currently manual are the Land Description File, Ownership and Status File, Serial Number Log File, Stipulations File, Regulation Reference File, Case File, Survey Plats, Control Document Index, and Reference Information. Automated files and manual files are described in Section III.B.4.

External automated and manual files which are accessed to retrieve data are: the Bond File, the Surety File, and the Qualifications File. External files are files currently maintained on systems operated by other BLM organizations or federal agencies and are described in Appendix A.

External systems which are accessed to retrieve data are: the Financial Management System, Minerals System I, the Solid Leasable Mineral System, and the Simultaneous Oil and Gas Leasing System. External systems are described in Appendix A.

Most external organizations that maintain files and systems interfacing with the current system are involved with the NEPA compliance process or appeals hearings on rejected applications. Files and systems of external organizations are described in Appendix A.

Once data are retrieved, the final subtask of the data retrieval task involves producing requested data in the desired format. The data retrieval task produces data used in the land status data base of the land availability verification, quality control check, and case tracking subtasks.

(3) Land Availability Verification Task. The application verification task submits data obtained from case files to the land availability verification task (block c in Figure III-3). The data retrieval task is also used to retrieve data and submit the data to the land status availability verification task.

The land availability verification task includes subtasks to review the data to verify that the land associated with the case is federally-owned and available for the purpose proposed in the case. This task also includes any field actions required to process the case.

The land availability verification task issues requests for data and outputs data about rejected applications and data used to update automated and manual case files. Requests for data about land attributes, finances, and application are used to determine if the land is federally-owned and available for the purpose proposed by the case. If the land is not available for the purpose proposed by the case, the application is rejected with an explanation of the reason for rejection. If the land appears to be available for the purpose requested, the case file is updated to reflect tentative authorization, and the file is forwarded to the case tracking task.

(4) Case Tracking Task. The land availability verification, data retrieval, and quality control check tasks produce data used by the case tracking task (block d in Figure III-3). The quality control check task submits data indicating notification of authorization denial to the case tracking task. The authorization issuance function submits data indicating the status of legal authorization documents to the case tracking task.

The case tracking task includes output subtasks to update case files with data that indicates the status or results of other tasks. For example, the case tracking task updates case records with data that results from and describes the status of the NEPA compliance process being performed by external organizations and systems, and of appeal hearings. The primary outputs of the case tracking task are updates to the case file that annotate the completion of each task of each phase of external processes.

The case tracking task tracks case activity as the case is being processed, and tracks disposition of the authorization issued after case processing is completed. When a case is no longer active, it is closed and may be archived to a historical case file. The case records can be retrieved and the closed case opened if required for such purposes as renewing an authorization or appealing a decision about the case. If a closed case is opened at any time, the case tracking task retrieves the case record(s) from the historical case file or other archived files through the data retrieval task and continues to monitor all subsequent case activity.

The case tracking task includes output subfunctions to update data in the case file, issue requests for NEPA and other compliance and appeals hearing data, process rejected applications, and generate status reports. The case tracking task outputs data (used to update case files) to the quality control check task for processing, and to the data retrieval task for archival purposes. The case tracking task submits requests for data produced by NEPA compliance and appeal hearings to the data retrieval task, and updates the data to reflect changes that result from monitoring the activities. If, for example, the case tracking task determines that a case is not in compliance with the NEPA process, the case will be rejected and a status report generated to inform the applicant that land-use is not in compliance with the NEPA. The case tracking task also rejects applications if the final quality control check indicates that the land is not available for the purpose proposed by the case. The case tracking task rejects applications by first updating the case record in the case file and then generating a letter to the applicant with an explanation of the reason for rejection. The case tracking task also includes subtasks to produce periodic status reports on cases used by BLM managers and applicants.

(5) Quality Control Check Task. The case tracking task submits data from case files to the quality control check task (block e in Figure III-3) for processing. The data retrieval task retrieves and submits other data needed for processing in the quality control check task.

The quality control check task involves manual adjudication, i.e., reviewing case and other data to verify that the land proposed for use by the case is federally-owned and available for the purpose requested by the case, and to decide whether to reject the application or to issue an authorization.

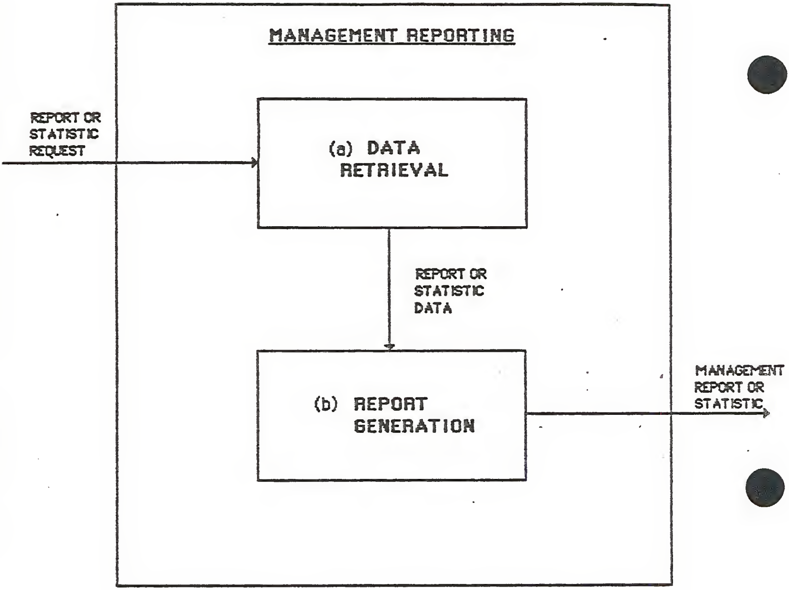
The quality control check task includes an output subtask to request data needed in processing data (such as the updated case files), to prepare notifications of authorization denial, and to prepare notification of authorization approval. Adjudicators who require data issue a request through the quality control check task, which processes the request for the data to the data retrieval task. If adjudicators decide to reject the application, the quality control check task updates the case data to denote rejection and submits the data to the case tracking task. If adjudicators decide to authorize use of the land as proposed by the case, the quality control check task updates the case data and submits the data to the authorization task function for further processing.

(6) Authorization Issuance Task. The quality control check task submits updated case data (including the notification of authorization approval) to the authorization issuance task (block f in Figure III-3).

The authorization issuance task uses the case data to prepare legal documents authorizing use of federally-owned land for the purpose proposed by the case.

The authorization issuance task includes subtasks to generate output (including the legal documents) and to update data used in the case tracking task.

c. Management Reporting Tasks. There are two management reporting and statistics tasks: data retrieval and report generation. Figure III-4 depicts the flow of information between these two tasks. The rectangles of Figure III-4 depict the tasks, and the arrows depict the information



MANAGEMENT REPORTING TASKS
INFORMATION FLOW DIAGRAM

FIGURE III-4

flowing into and out of each task. The inputs, processing, and outputs of each task are discussed below.

(1) Data Retrieval Task. BLM managers submit requests for reports or statistics. The data retrieval task (block a in Figure III-4) includes subtasks to obtain the data required to compile the report or to provide statistics from the current system data base.

Once retrieved, the data is submitted to the report generation task. If the data cannot be retrieved, the requester is notified.

(2) Report Generation Task. The data retrieval task (block b in Figure III-4) submits the data required for the report or the statistics to the report generation task.

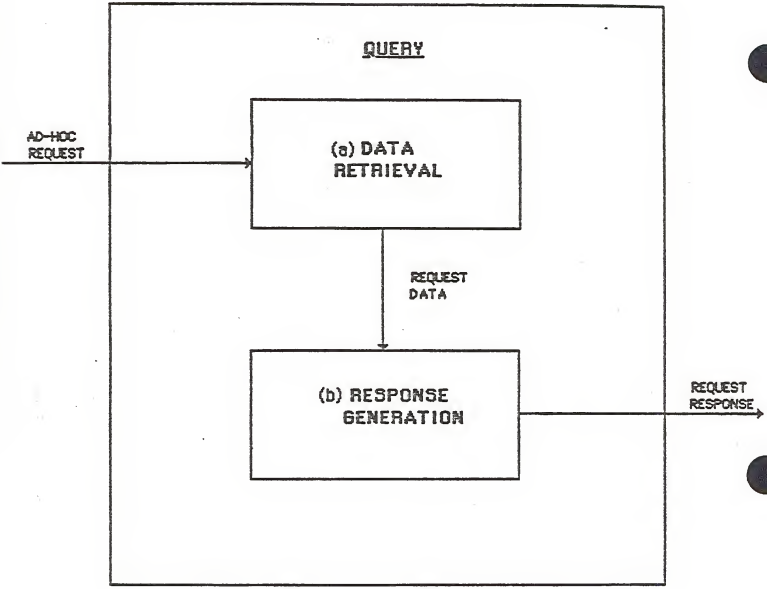
The report generation task includes subtasks to organize the data into the format required for output of the report or statistics, and to generate the report or the statistics. Automated reports may be reorganized manually into the required formats or summaries. Once generated, the reports or statistics are distributed manually to the requester(s) and/or to the appropriate BLM managers.

d. Query Tasks. There are two query tasks: data retrieval and response generation. Figure III-5 depicts the flow of information between these tasks. The rectangles of Figure III-5 depict the tasks, and the arrows depict the information flowing into and out of each task. These tasks are currently manual and receive the least automated support of the three tasks discussed. The inputs, processing, and outputs of each task are discussed below.

(1) Data Retrieval Task. All users submit ad hoc requests for land status, finance, and applicant data. The data retrieval task (block a in Figure III-5) includes subtasks to obtain the data required to generate a response to the request from the current system data base.

The data required to generate a response to the ad hoc query are submitted to the response generation task.

(2) Response Generation Task. The data retrieval task submits data required to generate the query response to the response generation task (block b in Figure III-5), which includes a subtask to organize the data into the format required for output of the query response.



QUERY TASKS INFORMATION FLOW DIAGRAM

FIGURE III-5

The response generation task also includes subtasks to generate the query response and to distribute the response to the requester and/or the appropriate BLM managers.

2. Users of the Current System

This subsection defines the classes and numbers of users of the current system, maps functional requirements to those user classes, and defines data access requirements for each user class. Table III-2 summarizes user classes and the functions they require.

a. User Class Definitions. There are four classes of users of the current system: BLM management users, BLM non-management users, external users, and public users. Defined below are the current system functions that each user class requires.

(1) Management Users. BLM managers have authorization to use case processing, management reporting, and query functions. Required authorizations are defined below by category of task.

(a) Case Processing Tasks. BLM managers currently perform case processing tasks because they are responsible for:

- Ensuring that all use of federally owned lands is in compliance with the National Environmental Protection Act and other compliance acts and regulations
- Issuing authorization for use of federally-owned lands as proposed in an application
- Making decisions about Lands and Minerals actions

(b) Management Reporting Tasks. BLM managers currently perform management reporting tasks, because they are responsible for:

- Making decisions about land and mineral actions
- Monitoring status of land, cases, and finances
- Ensuring quality control of case processing and land and mineral actions

CURRENT SYSTEM TASKS	CURRENT SYSTEM USER CLASS			
	BLM MANAGEMENT	BLM NON-MANAGEMENT	EXTERNAL	PUBLIC
Case Processing	X	X		
Management Reporting	X	X		
Query	X	X	X	X

CURRENT SYSTEM REQUIREMENTS BY USER CLASS

TABLE III-2

(c) Query Tasks. BLM managers currently perform query tasks, because they are responsible for:

- Making decisions about land and mineral actions
- Being informed about cases, office workload, and the status of land and mineral actions

(2) BLM Non-management Users. BLM non-management users require case processing, management reporting, and query functions. Required authorizations are defined below by category of task.

(a) Case Processing Tasks. Non-management users currently perform case processing tasks, because they are responsible for:

- Processing cases
- Performing the adjudication review on cases being processed
- Developing alternatives to resolve or address land-use problems
- Responding to general questions about currently active cases

(b) Management Reporting Tasks. Non-management users currently perform management reporting tasks, because they are responsible for:

- Analyzing land and mineral records problems
- Performing statistical and trend analysis

(c) Query Tasks. Non-management users currently perform query tasks, because they are responsible for:

- Analyzing land and mineral records problems
- Developing alternatives to land-use problems
- Responding to general questions about active and inactive cases

(3) External Users. External users of the current system consist of the Forest Service, Mineral Management Service, Geological Survey, Office of Surface Mining, Bureau of Indian Affairs, and selected State and Local Government. External users require the current system to perform query

tasks. External users require query tasks to obtain land status and attribute data.

(4) Public. Public users consist of private companies and citizens. The public requires the current system to perform query tasks. The public requires query tasks to obtain land status and attribute data.

b. Number of Users. Tables A-2, A-3, and A-4 in Appendix A contain details about the number of users of the current system and are summarized in Figures III-6 through III-8. Figure III-6 summarizes the data in those tables and depicts the distribution by user category of the actual count of BLM employees using the current system. Figure III-7 shows the full time equivalent (FTE) distribution by user category of users of the current system. Figure III-8 shows the FTE distribution by office by state of the current system. External and Public users are not included in these figures.

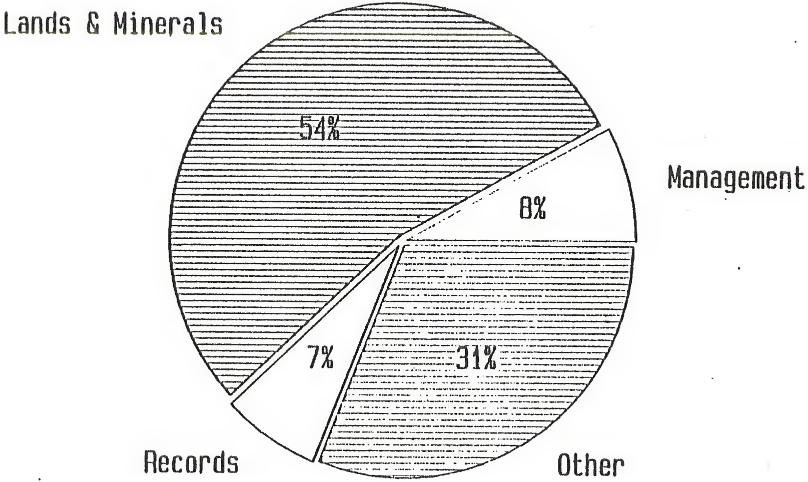
Table A-2 in Appendix A presents the total number of BLM non-management users of the current system by user class by office. Non-management users are divided into three categories: Lands and Minerals personnel, Records personnel, and other personnel. These divisions were made based on primary job responsibilities and use of the current system.

The total number of non-management users of the current system is 3,026. BLM estimates that only Lands and Minerals and Records personnel use the current system full time. Other users use the system approximately 20 percent of their workday. Table A-3 in Appendix A presents this Full Time Equivalent (FTE) distribution of current users. The number of FTE non-management users of the current system is 2,219.

Table A-4 in Appendix A provides the number of BLM management users and FTE management users by office. The total number of management users is 276. BLM estimates that 17.8 percent of a manager's workday is spent on Lands and Minerals and Records activities. The third column presents the FTE distribution of management users. The number of FTE management users of the current system is 49.

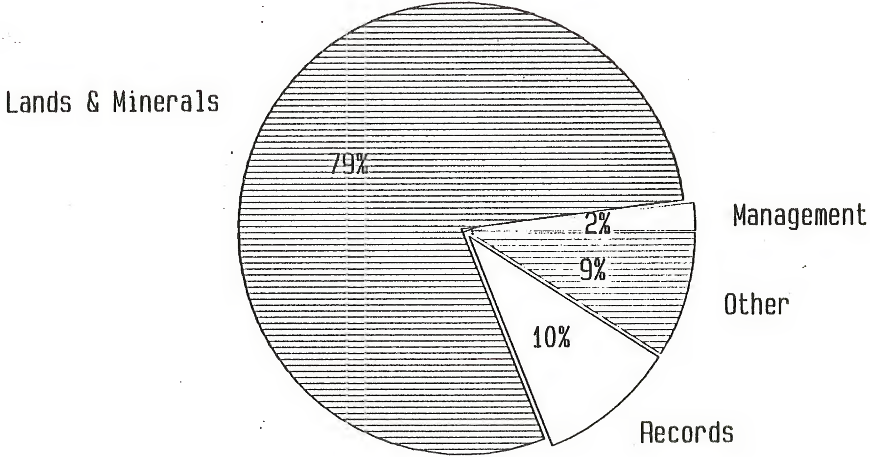
Public users are able to access data only from BLM public rooms. BLM has no estimates of the number of public users but does have estimates of the number of requests for Lands and Minerals and Records information received from public users. Public users are able to request information at all BLM offices in the public rooms.

External users currently access Lands and Minerals and Records data only from State Office public rooms--primarily because State Offices have the most complete set of Lands and Minerals and Records data needed by external users in their



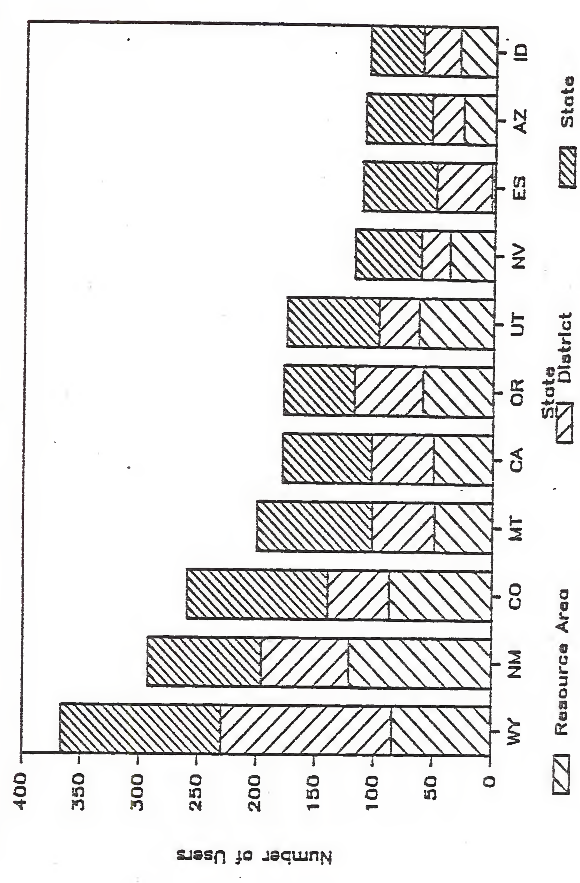
CURRENT SYSTEM INTERNAL USERS

FIGURE III-6



CURRENT SYSTEM INTERNAL USERS - FTE

FIGURE III-7



CURRENT SYSTEM INTERNAL USERS - FTE BY STATE

FIGURE III-8

jurisdiction. Some District and Area Offices currently distribute data to external users, but this data does not fully satisfy external user query requirements.

c. Data Access Requirements. Internal BLM users use the current system at all BLM offices (Headquarters, DSC, State Offices, District Offices, and Area Offices). Other users of the current system include public users and external users. To define data access requirements, external users have been divided in two groups: other Federal agencies (the Forest Service, Mineral Management Service, Geological Survey, Office of Surface Mining, and Bureau of Indian Affairs), and selected state and local governments. Access requirements for each category of internal BLM, external, and public user are described below and summarized in Figure III-9. Figure III-9 is a matrix that depicts current access requirements by BLM office type. In Figure III-9, "R" indicates that the user must be able to read the data, "C" indicates that a user must be able to change data, "S" indicates that a user must be able to*change or enter data only under special circumstances, and "S " indicates that a user must be able to change data about land and mineral resources that lie on geographic boundaries.

(1) Headquarters. BLM Headquarters has the authority to read the data of any State Office. Headquarters must also be able to change data in the following files:

- Surety Files
- Stipulations Files (Bureau-wide only)

(2) DSC. DSC has the authority to read the data of any State Office. DSC has no responsibility to add or change any information in the current system's files.

(3) State Offices. State Offices have the authority to read the data of any other State Office and to change the data pertaining to their own jurisdiction. The data pertaining to a State Office includes data of District and Area Offices within the jurisdiction of that State Office. State Offices are also able to change the data that pertains to a common state boundary shared with another State Office.

(4) District Offices. District Offices have the authority to read the data of any other District Office and to change the data pertaining to their own jurisdiction. District Office data includes all data of Area Offices within the jurisdiction of that District Office. District Offices are also able to change data that pertains to a common District boundary shared with another District Office.

		BLM USERS					EXTERNAL USERS		PUBLIC USERS
		HQ	DSC	State	District	Area	Other Federal Agencies	State & Local Governments	
IN-STATE	STATE	R/S	R/S	R/C	R	R	R	R	R
	DISTRICT	-	-	R	R/C	R	R	R	R
	AREA	-	-	R	R	R/C	R	R	R
OUT-STATE	STATE	R/S	R/S	R/S*	R	R	R	-	R
	DISTRICT	-	-	R	R/S*	R	R	-	R
	AREA	-	-	R	R	R/S*	R	-	R

R= Read Only
C= Change
S= Special Case
S*= Boundary Condition

CURRENT SYSTEM

DATA ACCESS REQUIREMENTS

FIGURE III-9

(5) Area Offices. Area Offices have the authority to read the data of any other Area Office and to change the data pertaining to their jurisdiction. Area Offices are also able to change the data that pertains to a common Area boundary shared with another Area Office.

(6) Other Federal Agencies. Other Federal agencies have the authority to obtain information about certain data elements on certain records of any BLM Office.

(7) State and Local Governments. Selected state and local governments have the authority to obtain information on certain data elements on certain records of any BLM office within that Government's jurisdiction.

(8) Public. Public users have the authority to read certain data on certain records of any BLM office that they are legally authorized to access.

3. Current System Workload

This subsection presents the current volume of data. The volumes of data in files and external files are estimates based on BLM's assessment of the peak loads anticipated in FY 1985. These workloads are derived from systems currently in use, most of which are manual. Estimates are also provided of the maximum number of transactions generated daily for alphanumeric work and spatial graphics input associated with maps, plats, surveys, and other graphic information. Outputs can be estimated based on the input to output ratio presented in Table III-3. This table presents the ratio of transactions to characters for each function.

The data for number of characters input and output for the Case Processing alphanumeric and graphic data came from page 13 of the ALMRS "Requirements Document." The data for number of characters input for Query alphanumeric and graphic data came from a summary sheet developed during the August, 1985 meeting between DSC and FEDSIM personnel. The data for number of characters output for Query alphanumeric came from page 18 of the ALMRS "Requirements Document." The data for number of characters output for Query graphic came from page 19 of the ALMRS "Requirements Document." The data for number of characters input and output for the Management Reporting function came from the meeting between DSC and FEDSIM personnel in September, 1985.

Alphanumeric data includes fixed length and variable length records. Examples of data that are stored in fixed length records are names, dates, telephone numbers, and other data that conforms to pre-defined formats. Fixed length data elements typically have 50 or fewer characters of data. Variable length records include text, such as a page of a document. Text is referred to as variable length, because a page can be partially or totally full. Typically, a full page has 2500 characters. Alphanumeric input currently is provided by hand-written application forms,

FUNCTION	CHARACTERS PER TRANSACTION INPUT	CHARACTERS PER TRANSACTION OUTPUT
Case Processing Alphanumeric	650	7,150
Case Processing Graphic	100	79,740
Management Reporting	150	7,500
Query Alphanumeric	100	7,750
Query Graphic	100	72,000

RATIO OF TRANSACTIONS TO CHARACTERS
BY FUNCTION

TABLE III-3

typewriters, and computer workstations. All inputs are provided using standard English alphabet, numbers, and symbols.

Alphanumeric output can be either textual or non-spatial graphics. Textual output includes pages in a document or a preformatted report containing management information or statistics.

Spatial graphics data are currently contained on survey plats or maps. The maps are marked to depict the current use of land and mineral resources.

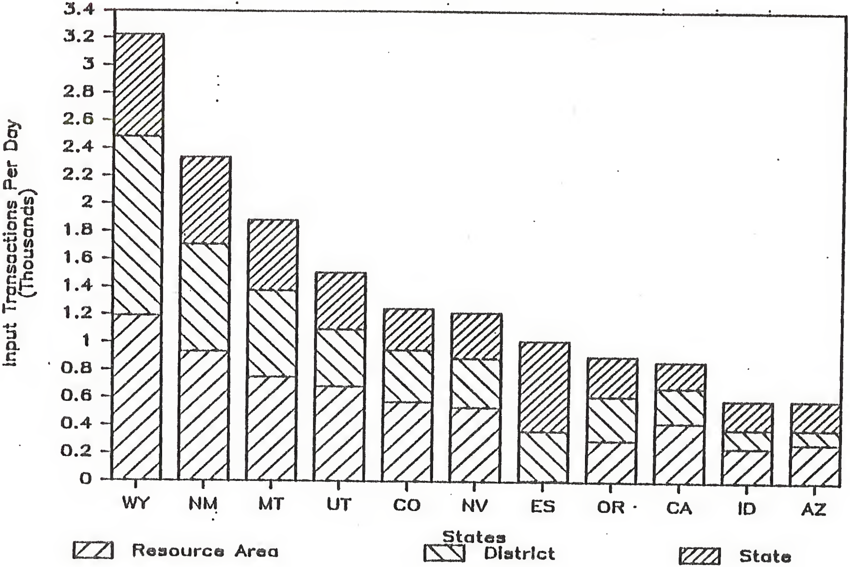
a. Internal Data Volume Requirements. Tables A-5 through A-8 in Appendix A estimate the daily number of transactions currently input to the current system. These transactions produce alphanumeric and spatial graphics data. Figures III-10 through III-12 summarize the information in these four tables by state. Table A-5 and Figure III-10 estimate the volume of alphanumeric and graphic transactions for case processing tasks by state by office. Table A-6 and Figure III-11 estimate of the volume of transactions for management reporting tasks by state by office. Tables A-7 and A-8 are summarized in Figure III-12. Table A-7 estimates the volume of transactions for query functions producing alphanumeric output. Table A-8 estimates the volume of transactions for query functions producing graphic outputs. Tables A-7 and A-8 are further divided into transactions generated internally by BLM and transactions generated by public users.

Tables A-5 through A-8 are summarized by task in Figure III-13, which indicates that query tasks have the largest volume of transactions and that the volume of transactions for management information reporting tasks is the lowest. The query task currently has the least automated support in the Land and Minerals, and Records sections of BLM.

b. Volume of External Data. BLM currently obtains data from external manual files and automated systems (see Subsection III.B.1). Data from automated systems is obtained from DSC's DPS 8/70 computer. Tables A-9 and A-10 in Appendix A estimate the maximum volumes of data input to the current system from external systems, and output from the current system to external systems, respectively. These two tables are in units of thousands of characters.

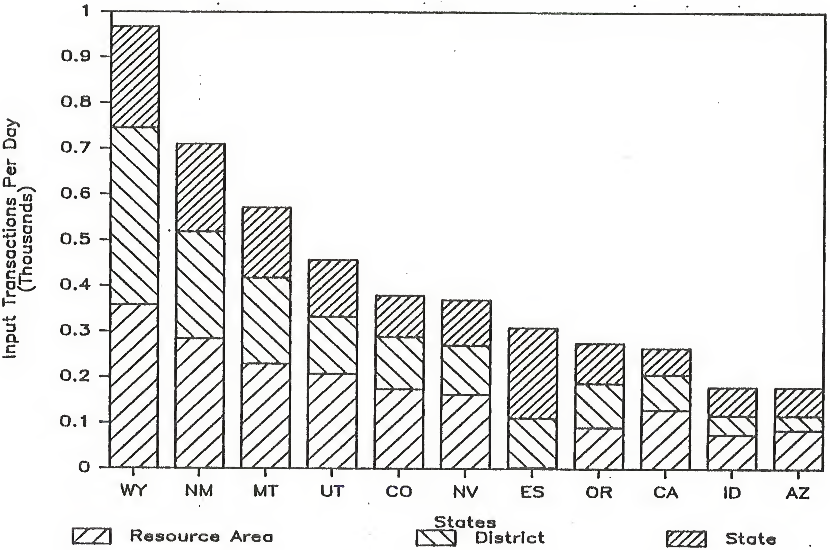
4. Current System Data Storage Requirements

This subsection describes the current system's files and estimates storage requirements. BLM must store all Lands and Minerals and Records data with sufficient redundancy and protection to protect it from media failure and natural disaster. Because there is currently no procedure for tabulating storage volumes for management reporting tasks and query tasks, no storage estimates are defined separately for these tasks. Current storage



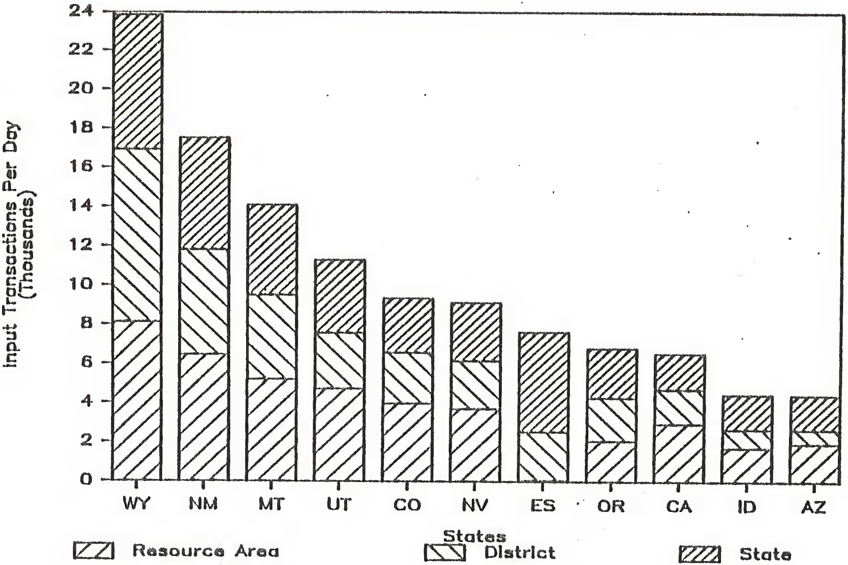
FY 1985 CASE PROCESSING WORKLOAD BY STATE

FIGURE III-10



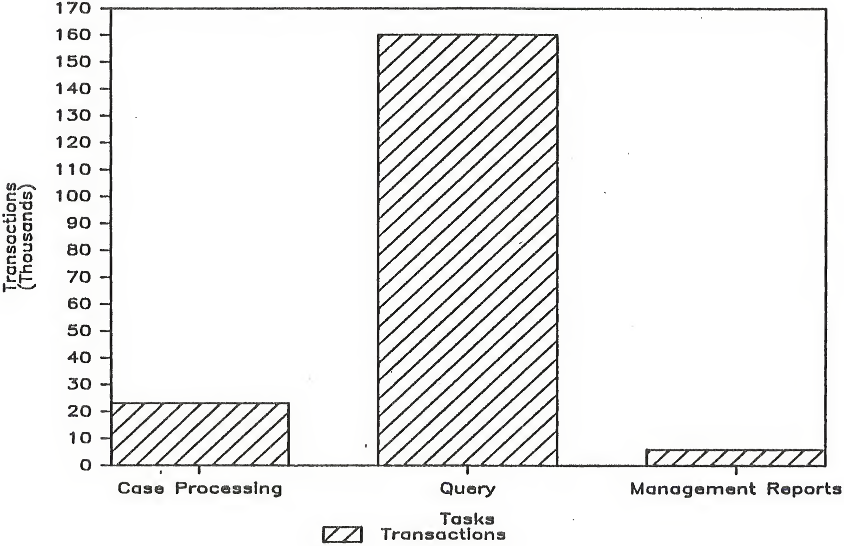
FY 1985 MANAGEMENT REPORTING WORKLOAD BY STATE

FIGURE III-11



FY 1985 QUERY WORKLOAD BY STATE

FIGURE III-12



TOTAL TRANSACTIONS BY CURRENT SYSTEM TASK

FIGURE III-13

required for case processing tasks includes storage for data needed in the management reporting and query tasks.

a. Current Manual Files. BLM maintains manual case files, survey plats files, control document index files, and reference information files used in the case processing task. Table III-4 estimates the total number of cubic feet required to store manual files by state. Descriptions of manual files are provided below.

(1) Case Files. Case Files are files of folders that contain legal instruments and documents, and other data needed for case processing and issuing authorizations.

(2) Survey Plat Files. Survey Plat Files contain copies of cadastral survey plats and field notes containing observations, measurements, and monuments of the land. Survey plats are currently maintained either on paper or microform (microfiche, roll, and 35 mm aperture cards).

(3) Control Document Index File. The Control Document Index File is a collection of 35 mm aperture cards containing images of title documents, patents, deeds, orders, and proclamations related to particular land and mineral resources.

(4) Reference Information File. Reference information consists of microfilm images of manual records (such as plats, historical indices, tract books, General Land Office plats, and indexes to mineral locations) as they existed at the time of photocopying for insertion to the files.

b. Current Automated Storage Requirements. BLM currently uses two automated systems to support certain case processing functions: the Mining Claims Recordation System and the Case Recordation System. As defined in the Data Access Requirements section of this document (Section III.B.2.c), the State Offices require access to all data of District and Area Offices within their jurisdiction. District Offices require access to the data of Area Offices within their jurisdiction. Consequently, all data for the Mining Claims Recordation System and Case Recordation System that are used to perform the case processing function are captured and stored on the DPS 8/70 computer operated by DSC. Table III-5 estimates the average number of characters currently contained in State Files.

5. Current System Performance Requirements

All current system tasks require voluminous input and output of alphanumeric and spatial graphic data. Alphanumeric data include the English alphabet, numbers, and symbols. It also includes non-spatial graphics output such as pie charts, bar charts, and simple plots. Spatial graphics data consists

STATES	CASE PROCESSING MANUAL STORAGE (CUBIC FEET)
Arizona	6,099
California	10,310
Colorado	9,530
Eastern States	10,890
Idaho	5,252
Montana	9,919
Nevada	6,255
New Mexico	18,205
Oregon	12,764
Utah	7,229
Wyoming	12,928
Total	109,381

CUBIC FEET REQUIRED FOR MANUAL
STORAGE BY STATE FOR FY 1985

TABLE III-4

STATES	CASE PROCESSING AUTOMATED STORAGE (THOUSANDS OF CHARACTERS)
Arizona	114,000
California	91,100
Colorado	149,500
Eastern States	25,700
Idaho	62,400
Montana	100,000
New Mexico	138,100
Nevada	174,900
Oregon	62,600
Utah	182,200
Wyoming	200,400
Total	1,300,900

VOLUME OF DATA STORED BY CURRENTLY AUTOMATED SYSTEMS BY STATE
IN THOUSANDS OF CHARACTERS FOR FY 1985

TABLE III-5

of scaled plats (maps) depicting contours and overlapping layers that indicate status, availability, and land attributes. The overlapping layers depict characteristics above, on, and below the surface of the earth. Table III-6 presents the current average and maximum turnaround time required for the outputs of each function. These turnaround times represent BLM management objectives--not actual turnaround times. Actual turnaround time of the current system is reportedly not satisfying these objectives. Required turnaround times do not differentiate among user classes.

C. PROBLEMS

To process cases, respond to management and public queries, or respond to management requests for reports and statistics, current system entities require access to data about land attributes, finance, and applicants (see Figure III-1). Most data reside on historical documents that are manually maintained. The historical documents are comprised of graphics, cadastral survey plats, images of legal documents (titles, patents, and deeds), and alphanumeric text (written reports, including lands evaluations, resource evaluations, and applications). Many of the historical documents have been copied onto microfilm and 35 mm aperture cards and coated with a diazo compound.

One problem associated with the current system involves the present information flows in BLM Lands and Minerals, and Records operations. Each state is relatively independent and is free to institute its own data forms and formats, its own procedures, and its own distribution of storage and activities. Current procedures and policies do not allow a uniform or smooth flow of information across organizational boundaries; nor do they allow any local efficiencies to be adopted by other BLM organizations.

Another problem associated with the current system involves user access to the current system's information. Although management needs access to all information concerning cases in its jurisdiction, the current manual and automated systems do not integrate data in a manner that affords management the needed access to that information.

Another problem involves the case workload for land use, which is expected to grow at the rate of 3.5 percent per year compounded. Although the case workload will grow, BLM does not anticipate a corresponding increase in the number of personnel allocated to processing land use cases. With an increasing case workload and a static staffing level, serious case backlogs could result. Backlogs and heavy workload typically cause subsequent problems such as poor staff morale and attrition.

Another problem is that current manual files are difficult to research. When queries involving more than one file are possible,

FUNCTIONS	ALPHANUMERIC AVERAGE (MINUTES)	ALPHANUMERIC MAXIMUM (MINUTES)	GRAPHIC AVERAGE (MINUTES)	GRAPHIC MAXIMUM (MINUTES)
Verification and Case Processing				
° Application Verification	5	10	5	10
° Land Availability Verification	1	1	5	10
° Quality Control Check	1	1	5	10
Management Reporting and Statistics	30	1440	N/A*	N/A*
Query	5	10	1080	1440

*Not Applicable

REQUIRED TURNAROUND TIMES OF THE CURRENT SYSTEM IN MINUTES

TABLE III-6

they are slow and time consuming, and it is difficult to verify the accuracy of their results.

Another problem is that present manual files make some queries impossible to perform--either because answers are needed more quickly than they can be found manually or because the query is so complex that it cannot practicably be done manually.

Another problem is that the present manual files make some required management reports impossible to produce--either because information is needed more quickly than it can be gathered manually or because the report is so complex that it cannot be prepared manually.

Because of the relative independence of each state, and the lack of centralized policies and procedures, available information is difficult to organize, verify, and consolidate across state boundaries.

Because of the problems associated with the query and management reporting tasks, the present system is unable to provide land status information to produce up-to-date Resource Management Plans and Environmental Impact Statements that is properly scaled or formatted and produced efficiently and timely.

In most instances, active manual case files maintained in State, District, and Area Offices have no backup copy, are extremely vulnerable to loss, and are difficult or impossible to reconstruct should such loss occur.

Finally, BLM has many problems with historical documents. The diazo coatings on microfiche documents are causing serious document deterioration from light exposure, and comprehensive sets of records are accessible at only a few offices. Consequently, BLM is experiencing back-logs in processing cases; in responding to public, external user, and management queries; and in responding to management requests for reports and statistics. These problems severely limit BLM attempts to achieve balanced and effective multiple use management of Federally-owned lands and produce reports required by the public and by Congress.

IV. ALMRS REQUIREMENTS

This section describes the functional requirements of ALMRS. ALMRS will automate many functions now performed manually in an attempt to resolve the problems described in Section III.C.

A. ALMRS FUNCTIONS AND FLOWS

Functions to be automated by ALMRS are defined below and summarized in Figure IV-1.

1. Summary of ALMRS Functions

a. Case Processing Functions. BLM processes applications for land use and issues authorizations to qualified applicants. Each application is referred to as a case. Functions now performed to process cases are defined in Section III.A. of this document. The case processing functions that require automation in ALMRS are: (1) application data capture, (2) application verification, (3) data retrieval, (4) alphanumeric land availability verification, (5) spatial graphics land availability verification, (6) case tracking, (7) quality control, and (8) authorization issuance. Requirements for automation of these functions are defined in Section IV.A.2.

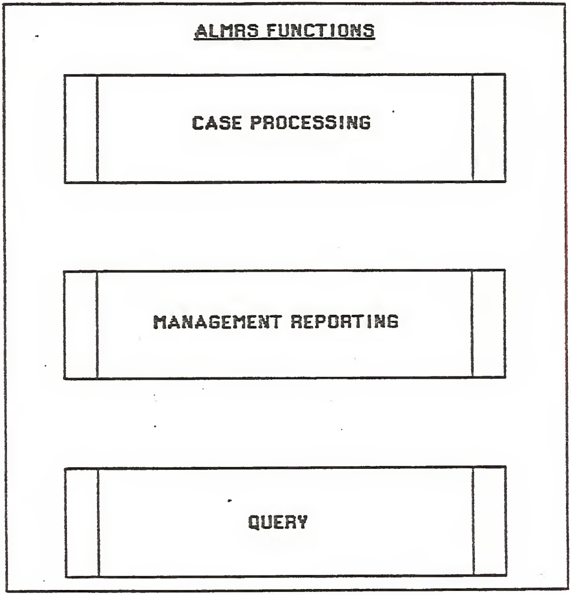
b. Management Reporting Functions. Management reporting functions involve generating preformatted reports containing information about land description, ownership, and use for the DOI. The management reporting functions to be automated by ALMRS are: (1) request processing, (2) data retrieval, and (3) report generation. Requirements for automation of these functions are defined in Section IV.A.3.

c. Query Functions. Query functions involve responding to ad hoc requests from ALMRS users for accurate land status, financial, and applicant data. Functions to be automated by ALMRS are: (1) request processing, (2) alphanumeric data retrieval, (3) alphanumeric responses to requests, (4) spatial graphics data retrieval, and (5) spatial graphics responses to requests. Requirements for automation of these functions are defined in Section IV.A.4

All ALMRS functions require access to the ALMRS data base, which will be comprised of both automated and manual files. Data requirements for the ALMRS data base are defined in Section IV.C., and data base storage requirements are defined in Section IV.D.

2. ALMRS Case Processing Functions.

The seven case processing functions proposed for automation by ALMRS are: application data capture, application verification, data retrieval, alphanumeric land availability verification, spatial graphics land availability verification, case tracking,



SUMMARY OF ALMRS AUTOMATED REQUIREMENTS

FIGURE IV-1

quality control checks, and authorization issuance. In Figure IV-2, which depicts the information flow between functions, rectangles depict functions and arrows depict information flows. Requirements for automated case processing functions are discussed below.

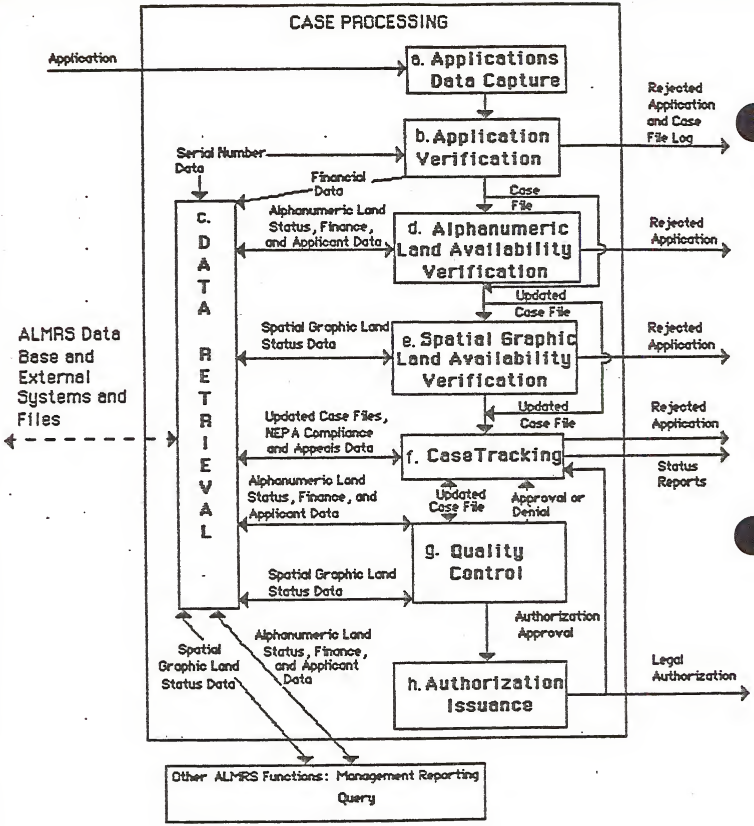
a. ALMRS Application Data Capture Function. The public; private individuals; selected Federal, state, and local governments; and BLM submit applications for use of federal lands to BLM personnel. BLM personnel manually scan the application to determine if the application is correct and complete. If the scan reveals that the application is not correct or complete, they reject the application by returning it to the applicant along with an explanation. If the scan by BLM personnel determines that the application is correct and complete, BLM personnel will enter the application data into ALMRS through the automated data capture function.

Application data consists of both alphanumeric and spatial graphics data. Alphanumeric data consists of text describing the applicant, desired use of the land, land description information, and other data. When required, spatial graphics data consists of scaled plats depicting overlapping layers of resources and land characteristics that are relevant to the application. The overlapping layers depict data about resources and land characteristics above, on, and below the surface of the land. The plats are drawn using standard scales (as defined by BLM regulations) to depict the applicant's proposed use of the Federal land.

For example, if the applicant proposes to drill for oil on Federal land, the application is usually accompanied by a cadastral survey plat (sized according to the standard scales) that depicts the location of the oil reserve and the proposed drilling site. The background portion of the plats in the BLM-standard scale depicts land attributes and existing resources.

ALMRS will automate the capture and processing of the alphanumeric and graphics data from applications. BLM public room personnel will enter alphanumeric data from applications into a case file and will work with the applicant to resolve missing or inaccurate data. If no survey plat is included with the application and one is required, BLM public room personnel will generate a background plat for the applicant to use in completing the graphics data needed for the application. Once the alphanumeric data from the application are complete and accurate, the data are captured in the Case File of the ALMRS data base.

The graphics data on the applicant's plat may be denoted by spatial coordinates referred to as section corner points. Digitizing equipment may be used to capture reference points from cadastral survey plats. Other spatial graphics data will


CASE PROCESSING
Application
a. Applications Data Capture
Rejected Application and Case File Log
b. Application Verification
Serial Number Data
Financial Data
Case File
c. DATA RETRIEVAL
Alphanumeric Land Status, Finance, and Applicant Data
d. Alphanumeric Land Availability Verification
Rejected Application
Updated Case File
Spatial Graphic Land Status Data
e. Spatial Graphic Land Availability Verification
Rejected Application
ALMRS Data Base and External Systems and Files
Updated Case File
Updated Case Files, NEPA Compliance and Appeals Data
f. CaseTracking
Rejected Application
Status Reports
Alphanumeric Land Status, Finance, and Applicant Data
Updated Case File
Approval or Denial
g. Quality Control
Spatial Graphic Land Status Data
Authorization Approval
Alphanumeric Land Status, Finance, and Applicant Data
Spatial Graphic Land Status Data
h. Authorization Issuance
Legal Authorization
Other ALMRS Functions: Management Reporting Query

INFORMATION FLOW DIAGRAM OF
CASE PROCESSING FUNCTIONS

FIGURE IV-2

be calculated from arc-node relationships and minor aliquot parting algorithms.

b. ALMRS Application Verification Function. The proposed ALMRS application verification function will automatically edit incoming applications (according to edit criteria required for the ALMRS data base) to determine that the appropriate alphanumeric and spatial graphics data from the applications are complete and accurate.

The ALMRS application verification function has three subfunctions: (1) update the Rejected Applications File, (2) request serial number data from the Case and Financial Files, and (3) update the case file. If the edit of the application data determines that an application is not complete or accurate, ALMRS will automatically update its Rejected Applications Files and generate a hardcopy "form" letter indicating that the application has been rejected and explaining the reason for rejection. Upon receiving the message and the hardcopy letter, BLM personnel will send the letter and the rejected application to the applicant.

If the edit determines that an application is complete and accurate, serial number data will be requested for the Case File through the ALMRS data retrieval function. The application verification subfunction will then establish the case record in the Case File, assign a serial number to the case based on the serial number data received from the data retrieval function, and submit the application data for processing by the alphanumeric land availability function. If financial data are contained in the application, the application verification subfunction will forward the data through the data retrieval function to the financial file(s). A copy of application data will be printed along with a cover sheet, which BLM personnel will use to catalog and maintain manual case files. Manual case files will also contain all legal documents associated with the case.

c. ALMRS Case Processing Data Retrieval Function. Most case processing functions will submit data to and request data from the ALMRS data base through the proposed ALMRS data retrieval function. The application data capture function and the application verification function include subfunctions that request serial numbers and submit data used to update case and financial files through the data retrieval function. The alphanumeric land availability verification and quality control check functions include subfunctions that request alphanumeric land status, case financial condition, stipulations data, and applicant qualifications data from the data base.

Similarly, the spatial graphics land availability verification function and the quality control checks function include subfunctions that submit requests for spatial data analysis. The case tracking function submits data used to update case files. Management Reporting functions and Query functions also include subfunctions that request data from the ALMRS data base.

The case processing data retrieval function is comprised of the following subfunctions:

- Process requests for ALMRS data from other Case Processing functions.
- Retrieve ALMRS data from internal ALMRS data base files, manually maintained files, external files and systems, and data from files from other organizations.
- Respond to requests for ALMRS data.

The data retrieval function will be comprised of programs or procedures that interface with programs or procedures in other case processing functions. For example, the application verification function issues a request for serial number data from the serial number log file of the ALMRS data base to assign a serial number to a new case. Other case processing functions will issue a request for ALMRS data, formatted to correspond to the data requirements of the ALMRS data base. The request will be processed to determine if it is from an authorized source and in a format that can be further processed. The data retrieval function will include programs or procedures for interfaces to the ALMRS data base, to manually maintained files, to other BLM files and systems, and to files and systems maintained by external organizations.

The automated files that will comprise the ALMRS data base are:

- Legal Land Description
- Geographic Coordinates and Features
- Master Name
- Ownership and Status
- Serial Number Log
- Stipulations
- Regulation Reference
- Case Files

Manually maintained files of legal and historical documents that will be referenced internally by ALMRS are:

- Manual Case Files
- Manual Survey Plats File
- Control Document Index File
- Reference Information File
- Historical Index in Microform
- Master Title Plats in Microform

ALMRS will also provide programs or procedures for interfaces to files maintained by other BLM and DOI organizations, including:

- Geographic Coordinates Cadastral Survey Files
- Resource Data Files
- Bond Files
- Surety Files
- Applicant Qualification Files

ALMRS will also provide programs and procedures for interface to systems operated by other BLM organizations. The external systems requiring interface to ALMRS are:

- The BLM Financial Management System
- The Minerals System I
- The Solid Leasable Mineral System
- The Simultaneous Oil and Gas Leasing System
- The Bonus and Rental Accounting Support System
- The Production Accounting and Auditing System
- The Auditing and Financial System

Data requirements of the ALMRS data base are defined in Section III.B.3. of this document. Storage requirements, including file sizes, are defined in Section IV.D.

Responses to requests for ALMRS data will be processed using the data retrieved. Responses will be processed to conform to the format required by the requestor.

The output subfunction of the data retrieval function will include programs or procedures to output alphanumeric land status, financial information, applicant qualification data, spatial graphics land status data, and data to update case files. This includes programs that output: alphanumeric land status, financial, and applicant qualification data for use in the alphanumeric land availability verification and quality control check functions; spatial graphics land status data to the spatial graphics land availability verification and the quality control check functions; and data from case files to all other case processing functions.

d. Alphanumeric Land Availability Verification Subfunction. The application verification function outputs verified application data for further processing in the alphanumeric land availability verification function. This function includes a subfunction for verifying that the land and rights to the resource associated with the case are federally-owned and available for the proposed purpose by comparing land status, financial condition, and applicant qualification data to case data.

First, the alphanumeric land availability verification function will request alphanumeric land status attribute, financial condition, and applicant qualification data through the data retrieval function. Land description and ownership data will be compared to land descriptions in the case file. The description will be used to determine if the land or resource is Federally-owned and to update the case file with the results of the comparison. If the comparison indicates that the land or resource is not Federally-owned, a form letter will be generated indicating that the application has been rejected because the land is not federally-owned. BLM personnel will then send the letter to the applicant and insert a copy in the manual case file.

If the land or resource proposed for use is determined to be Federally-owned, the case will be further processed to determine if the applicant is legally and financially qualified to use the land or resource. To determine if the applicant is qualified, applicant data contained in the case file will be compared to data (such as criteria for qualification) in the applicant qualification file, and the case file will be updated with the results of the comparison. If the applicant is determined not to be legally or financially qualified to use the land or resource, a form letter will be generated indicating that the application has been rejected because the applicant is not financially or legally qualified. BLM personnel will then send the letter to the applicant and insert a copy into the manual case file.

If the applicant is determined to be qualified, the case will be processed further to determine if the land or resource is available for the proposed use. Alphanumeric land status data will be compared to the proposed use data to determine availability for the proposed use and to update the case file with the results of the comparison. If the proposed use is determined to be incompatible with land resources or physical characteristics, the application will be rejected, and a form letter will be generated indicating that the application has been rejected and describing the incompatibilities. For example, if the applicant is proposing that a fence be built where an endangered species nest is located, the system would generate a form letter explaining that the application has been rejected due to a potential threat to endangered species. BLM personnel will then send the letter to the applicant and insert a copy into the manual case file.

If the land or resource is determined to be available for the proposed use, the case will be processed further, including updates to the case file and further processing in the spatial graphics land availability verification function.

e. Spatial Graphic Land Availability Verification Function. The alphanumeric land availability verification function produces output (including updated case files) that is submitted to the spatial graphics land availability verification function for further processing. In certain instances, the case will be submitted directly to the spatial graphics land availability function from the application verification function, bypassing the alphanumeric land availability function. Data required for processing (including spatial graphics land status data) are retrieved through the data retrieval function.

The spatial graphics land availability verification function consists of subfunctions that automatically portray multiple spatial features of land and mineral characteristics on a graphic plat of the land proposed for use in the application. Multiple portrayals are compared to determine conflicts, i.e., combinations of uses that are incompatible.

If the land characteristics and uses are determined to be incompatible, a form letter will be generated indicating that the application has been rejected and describing the incompatibility. A message will also be generated to the case tracking function. BLM personnel will then send the letter to the applicant and insert a copy into the manual case file.

If the land is determined to be available for the proposed use, the spatial graphics land availability verification function will update the case file and forward the case to the case tracking function.

f. Case Tracking Function. The spatial graphics land availability verification, data retrieval, and quality control check functions produce output used by the case tracking function for further processing. For example, the quality control check function submits data on notification of authorization denial. Another example is data submitted by the authorization issuance function and extracted from authorization files. These and other data are used to track cases in the case tracking function.

The case tracking function will include programs and procedures to monitor all case activity. For example, the case tracking function includes a subfunction for ensuring that the case data are complete prior to processing by the quality control check function and then again immediately after the quality control check. The case tracking function will monitor activity and update the case file with data that reflect the current status of the case.

The case tracking function will update case files with data provided by the data retrieval function. For example, tracking cases includes updating case files with data that result from National Environmental Protection Act (NEPA) compliance process and appeals hearings. The case tracking function tracks all case actions, and updates case files by annotating the completion of each phase of the activity.

Cases are tracked as long as they are active, i.e., as long as the case is being processed by ALMRS or an authorization is being used. When a case is no longer active, the case tracking function will close the case by archiving some of the case data in the case file to tape or other storage media. If at any time a closed case is opened due to renewing an authorization or to a case appeal, the case tracking function will retrieve the case data from the archived case data using the data retrieval function. Once reopened, the case tracking function will continue to monitor all subsequent case activity.

The case tracking function will include programs or procedures to provide output to respond to requests for case tracking data and files, and case status reports. The case tracking function will submit requests for case data from the case file using the data retrieval function, as required, for updating case tracking data and files. The function will also include programs or procedures for archiving closed cases. The case tracking function will also output data used in other ALMRS functions to produce periodic case status reports.

g. Quality Control Function. The case tracking function will produce output including case data which is submitted to the quality control check function. The data retrieval function will retrieve and submit alphanumeric data and spatial graphics data needed for processing by the quality control function.

The quality control function will include programs or procedures that adjudicators can use to verify that the land or resource proposed for use by the case is Federally-owned, that the applicant is qualified and that the land or resource is available for the purpose requested by the case; and to decide whether to reject the application or to issue an authorization. Programs and procedures will provide adjudicators with all data used to perform the alphanumeric land availability verification and spatial graphics land availability verification functions, and data that summarizes the output of those functions.

The quality control function will also include programs or procedures to produce output to respond to requests for alphanumeric and spatial graphics data, case data, and authorization denial or notification approval data. If adjudicators decide to reject the application, the quality control function will return the updated case data to the case file first through the case tracking function (to track that the authorization is denied). The case tracking function will in turn submit the data to the data retrieval function. If adjudicators decide to authorize use of the land or resource as proposed, the quality control function will return the updated case data to the case tracking function. The case tracking function will forward the data to the ALMRS data base through the data retrieval function.

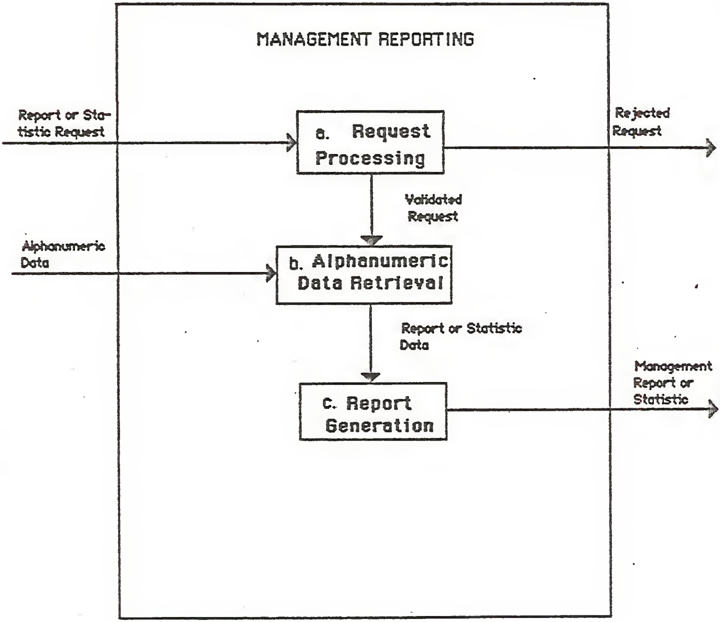
h. Authorization Issuance Function. The quality control function will produce output including data needed to prepare the authorization for use of federal land for the proposed purpose to the authorization issuance function.

The authorization issuance function will include programs or procedures to prepare data needed to produce legal documents referred to as authorizations. The function will also include programs or procedures for output of authorization data, including: authorization documents, leases and permits, and data used to update case files by the case tracking function.

3. Management Reporting Functions.

The three management reporting functions are: request verification, alphanumeric data retrieval, and report generation. Figure IV-3 provides an information flow diagram of the functions. The rectangles of Figure IV-3 depict the functions, and the arrows depict the information flowing into and out of each function. The inputs, processing, and outputs of each function are discussed below.

a. Request Processing Function. Users will submit a request for preformatted management reports or reports containing statistics. The request will be input through the request processing function. Data needed to process the request will be retrieved from the ALMRS data base through the data retrieval function.



INFORMATION FLOW DIAGRAM OF THE MANAGEMENT REPORTING FUNCTIONS

FIGURE IV-3

The request processing function will include subfunctions to create a request, edit the request for validity, reject invalid requests, verify that the request is authorized, and submit the valid, authorized request to the data retrieval function for processing.

The request creation subfunction will include an on-line menu of reports that can be produced. The requestor will select the desired report, input request parameters, and submit the request for processing by the request verification subfunction.

The request verification subfunction will include programs that compare the request to the set of preformatted reports to determine if the request can be satisfied by one of the preformatted reports.

If the request cannot be satisfied by one of the preformatted reports, the request will be rejected, and a message will be generated to the requester indicating that the request is not valid. If the request can be satisfied by one of the preformatted reports, the system will verify that the request is from an authorized user and then submit the request to the data retrieval function.

b. Data Retrieval Function. The request verification subfunction of the request processing function will produce output including valid authorized requests for reports that are submitted to the data retrieval function. The data retrieval function retrieves the data required to compile the report.

The data retrieval function will include programs on procedures that determine what data are needed to produce the report, based on the parameters specified in the request. Data are then retrieved from the appropriate files of the ALMRS data base. If data cannot be retrieved, a message will be generated notifying the requestor to modify the parameters of the request.

Once data are retrieved, the request and the corresponding data are submitted to the report generation function for further processing. Reports to be generated include reports that depict alphanumeric data and/or that summarize the data using graphics referred to as "non-spatial" graphics. Non-spatial graphics include pie charts, bar charts, and other graphics.

The data are then submitted to the report generation function.

c. Report Generation Function. The data retrieval function submits the request and the data required for generation of the requested reports to the report generation function. The report generation function organizes the data as required for output, according to the format and media requirements of the report and requestor. If the report cannot be generated, a message will be generated notifying the requestor to modify the parameters of the request.

Once generated, reports are disseminated to users in the proper format and media.

4. Query Functions.

The five query functions are: (1) request processing, (2) alphanumeric data retrieval, (3) alphanumeric response generation, (4) spatial graphics data retrieval, and (5) spatial graphics response generation. Figure IV-4 provides an information flow diagram of the functions. The rectangles of Figure IV-4 depict the functions, and the arrows depict the information flowing in and out of each function. The inputs, processing, and outputs of each function are discussed below.

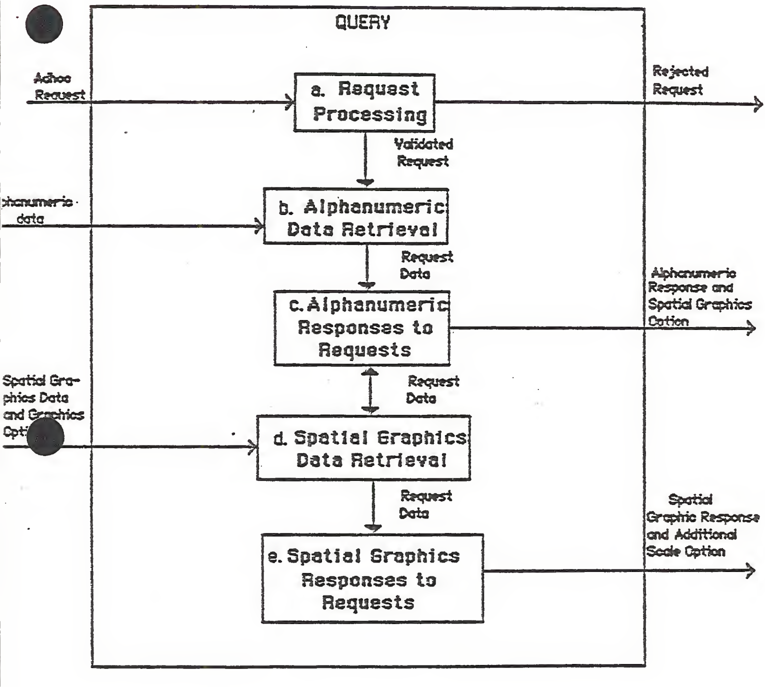
a. Request Processing Function. BLM users, external users, or public users will submit requests for data in the ALMRS data base. The request processing function will include subfunctions to create a request and submit the request for needed data to the data retrieval function. The ad hoc request will require retrieval of alphanumeric and/or spatial graphics data. Requests for alphanumeric data will include requests for responses in text and/or non-spatial graphics formats. Requests for spatial graphics information will include requests for scaled plats that depict overlays of multiple land characteristics and status.

The request processing function will include subfunctions to verify the validity of the request. There are three permissible queries: simple query, compound query, and complex query. Each query type is defined below:

(1) Simple Query. A simple query is a query which requires a single value response that can be retrieved from data in the ALMRS data base. Responses to simple queries will be limited to one page of output.

(2) Compound Query. A compound query is a query which requires a response consisting of single values or a range of values that can be calculated from data retrieved from the ALMRS data base. Responses to compound queries range from two to four pages of output.

(3) Complex Query. A complex query is a query that can be satisfied by responding to a series of simple and compound queries. Responses to complex queries range from three to ten pages of output.


QUERY
Adhoc Request
a. Request Processing
Rejected Request
Validated Request
phanumeric data
b. Alphanumeric Data Retrieval
Request Data
c. Alphanumeric Responses to Requests
Alphanumeric Response and Spatial Graphics Option
Request Data
Spatial Graphics Data and Graphics Opti
d. Spatial Graphics Data Retrieval
Request Data
e. Spatial Graphics Responses to Requests
Spatial Graphic Response and Additional Scale Option

QUERY FUNCTIONS INFORMATION FLOW DIAGRAM

FIGURE IV-4

The request processing function has a request creation subfunction that will include programs or procedures to support menu-driven selection of the desired query and input of query parameters.

The request verification subfunction will include programs or procedures that verify that requests are valid and authorized. If the request verification determines that the request is not valid, the system will generate a message to the requestor indicating that the request is not valid. If the request verification subfunction determines that a request is valid, the system will then verify that the user is authorized access to the data requested.

The function will also include a subfunction to output the results of request creation. If the request is determined to be valid and authorized by the request verification subfunction, the request will be submitted to the alphanumeric data retrieval function for further processing.

b. Alphanumeric Data Retrieval Function. The request verification subfunction submits all valid requests for data to the alphanumeric data retrieval function.

The alphanumeric data retrieval function will include programs or procedures to retrieve the alphanumeric data required to respond to the request.

The alphanumeric data retrieval function will include output subfunctions to submit the retrieved data needed to respond to the request to the alphanumeric response generation function.

c. Alphanumeric Response Generation Function. The alphanumeric data retrieval function will submit the data required to respond to the request to the alphanumeric response generation function. The response generation function will consist of subfunctions for organizing the data required for output of the alphanumeric response to the query and for actually generating the response to the requester. If applicable, the user will be prompted to select options for additional scaled spatial graphics response(s).

d. Spatial Graphics Data Retrieval Function. The requester may request additional data by selecting the spatial graphics option. The spatial graphics data retrieval function will include programs and procedures to retrieve the data needed to generate response to a request for spatial graphics data.

Spatial graphics data retrieval will also include subfunctions for integration of spatial graphics data and alphanumeric data. If required, the spatial graphics data retrieval subfunction will retrieve data required to respond to a request that requires both alphanumeric and spatial graphics data.

The spatial graphics data retrieval function will also include a subfunction to submit the data retrieved to the spatial graphics response generation function.

e. Spatial Graphic Response Generation Function. The spatial graphics data retrieval function will submit the data needed to respond to the request to the spatial graphics response generation function. The spatial graphics response generation function will include subfunctions to format the data into the requested scale, develop the query response, and output the response to the requester. A message offering the choice for another graphics theme (or overlay) will also be output. If the requester desires the spatial graphics output on another theme, the requester inputs the desired additional theme, and goes through the appropriate query functions again. There will be an estimated average of four themes per graphics output.

B. ALMRS USERS

This section maps requirements into user classes and defines security requirements for each user class. Table IV-1 summarizes ALMRS automated requirements and denotes the user classes that will require an ALMRS function.

1. User Class Definitions and Authorizations.

There will be four classes of ALMRS users: BLM management users, BLM non-management users, external users, and public users. All internal and external ALMRS users will be charged for their use of ALMRS in accordance with Office of Management and Budget (OMB) Circular A-121, "Cost Accounting, Cost Recovery, and Inter-Agency Sharing of Data Processing Facilities." The following subsections present the functions that each class of ALMRS user requires.

a. Management Users. BLM management users require ALMRS to perform case processing functions, management reporting functions, and query functions. Summarized below are the subfunctions of each function that management users will be authorized to perform.

(1) Case Processing Functions. Management users will be authorized to perform all case processing functions, because management is responsible for:

- Ensuring that all use of Federally-owned lands is in compliance with applicable laws and regulations.
- Issuing final authorization of public use of federally-owned lands as proposed by a case.

AUTOMATED FUNCTIONS	ALMRS USER CLASS			
	BLM MANAGEMENT	BLM NON-MANAGEMENT	EXTERNAL	PUBLIC
Case Processing	X	X		
Management Reporting and Statistics	X	X		
Query:				
Simple Queries	X	X	X	X
Compound Queries	X	X	X	X
Complex Queries	X	X		

ALMRS AUTOMATED REQUIREMENTS BY USER CLASS

TABLE IV-1

- Ensuring the rates of royalty and leases are correctly applied.

(2) Management Reporting and Statistics Function. Management users will be authorized to use all management reporting and statistics functions, because management users are responsible for:

- Requesting reports to obtain information to make decisions about land and mineral actions.

- Monitoring the status of land availability and use, cases, and finances.

- Ensuring quality control of land and mineral actions.

(3) Query Function. Management users will be authorized to use all query functions to respond to simple, compound, and complex queries, because management is responsible for:

- Requesting responses to queries to make decisions about land and mineral actions.

- Requesting responses to queries to determine the status of land availability and use, cases, and finances.

b. BLM Non-management Users. BLM non-management users require authorization to perform the following ALMRS functions: case processing, management reporting, and query.

(1) Case Processing Function. BLM non-management users will be authorized to use subfunctions of the case processing function, because non-management users are responsible for::

- Processing cases.

- Performing the adjudication review on cases being processed.

- Developing alternatives to land-use problems.

(2) Management Reporting Function. BLM non-management users will be authorized to use the management reporting functions, because non-management users are responsible for:

- Analyzing land and mineral resource problems.

- Performing trend analysis on land use, case financial condition, and case data.

- Performing statistical analysis of land attributes, financial data, and applicant data.

(3) Query Function. BLM non-management users will be authorized to use query functions to perform simple, compound, and complex queries. Authorization to perform these subfunctions is required to provide responses to queries to help non-management users:

- Analyze land and mineral resource problems
- Develop alternatives to land-use problems

c. External Users. ALMRS external users fall into two categories: other Federal users and non-Federal users. Other Federal users are the Forest Service, Mineral Management Service, Geological Survey, Office of Surface Mining, and Bureau of Indian Affairs. Non-Federal users include selected state and local governments--primarily from the western states. External users require access to ALMRS from their site to perform simple and compound query functions--primarily to obtain land status data.

d. Public Users. ALMRS public users consist of representatives from private companies and governmental organizations, and individuals who use ALMRS facilities at BLM locations. The public will require access to data provided by the query functions only--primarily to obtain land status data. Access to additional data may be granted, but would require additional authorization. Public users will not use ALMRS devices; rather, they will work with BLM employees to perform their queries.

2. Number of Users.

Tables A-2 through A-4 present the number of current internal BLM users. These tables show a total of 3,026 non-management users and 276 management users. BLM has determined, as these tables show, that there are 2,219 non-management and 49 management full time equivalent users. The number of external and public users is not known, but the workload associated from these users has been estimated. Over the 12-year ALMRS life cycle, BLM estimates that the number of internal users will remain constant. The 3.5 percent compounded growth in workload for this group is expected to result from the increased productivity of BLM personnel using ALMRS.

3. Security Requirements.

This subsection discusses ALMRS data security requirements and ALMRS physical security requirements.

a. Data Security Requirements. ALMRS data security requirements are categorized as: general data access

EXTERNAL SYSTEM/FILE	SECURE	PROPRIETARY
Geographic Coordinates File - Cadastral Survey		
Resource Data File		
Bond File	X	
Surety File	X	
Qualification File	X	
Financial Management System	X	X
Minerals System I	X	X
Solid Leasable Mineral System	X	X
Simultaneous Oil and Gas Leasing System	X	X
Bonus and Rental Accounting Support System	X	X
Production Accounting and Auditing System	X	X
Auditing and Financial System	X	X

EXTERNAL FILES AND SYSTEMS PROVIDING
SECURE AND PROPRIETARY DATA TO ALMRS

TABLE IV-2

FUNCTION	CHARACTERS PER TRANSACTION INPUT	CHARACTERS PER TRANSACTION OUTPUT	MINUTES PER TRANSACTION
Case Processing Alphanumeric	650	7,150	10
Case Processing Graphic	100	79,740	15
Management Reporting	150	7,500	N/A
Query Alphanumeric	100	7,750	5
Query Graphic	100	72,000	15

N/A = Not Applicable

RATIO OF TRANSACTIONS TO CHARACTERS
AND TERMINAL MINUTES BY FUNCTION

TABLE IV-3

SYSTEMS/FILES	VOLUME OF INPUT CASE PROCESSING (CHARACTERS x 1000)	VOLUME OF INPUT MANAGEMENT REPORTING (CHARACTERS x 1000)	VOLUME OF INPUT QUERY (CHARACTERS x 1000)
Bond	36	18	36
Surety	5	0	0
Qualification	5	5	0
Financial Management	13,332	13,332	0
Mineral System 1	8,651	3,460	0
Solid Leasable Mineral	2,548	1,019	0
Simultaneous Oil & Gas Leasing	3,081	0	0
Public Land Survey	0	0	0
Bonus & Rental Accounting Support	23,702	0	0
Production Accounting & Auditing	17,776	0	0
Auditing & Financial	37,331	0	0

VOLUME OF INPUT TO ALMRS FROM EXTERNAL SYSTEMS AND FILES
IN THOUSANDS OF CHARACTERS PER DAY FOR FY 1997

TABLE IV-4

requirements, secure data access requirements, proprietary payment data access requirements, classified data access requirements, and user identification code requirements. ALMRS data security requirements for each category are described below.

(1) General Data Access Requirements. To define general data access requirements, BLM users have been divided into categories according to the five BLM office types: Headquarters, DSC, State Offices, District Offices, and Area Offices. External users have been divided in two categories: other Federal agencies (Forest Service, Geologic Survey, Office of Surface Mining, Bureau of Indian Affairs), and non-Federal users (selected state and local governments). Public users remain as one category.

The data access requirements of BLM, external, and public users are described below and summarized in Figure IV-5, which depicts access requirements by user category by BLM office type. In Figure IV-5, "R" indicates that the user must be able to read the data (i.e., files containing data from that location must be write protected for that user category), "W" means that a user must be able to write or enter data into the file, "S" indicates that a user must be able to change or enter data only under special circumstances, and "S*" indicates that users must be able to write or enter data into files containing data about land mineral and resources that lie on geographic boundaries.

- Headquarters. BLM headquarters requires read access to files of any state office. Headquarters requires write access to the Regulation and Reference File; the Stipulations File (Bureau-wide only); and the Surety File.

- DSC. DSC requires read access to the files of any state office. DSC also requires write access to the Surety File and the Qualifications File.

- State Offices. State Offices require read access to their own files and the files of any other State Office. State Offices require write access to files pertaining to their office or geographic area only. The data pertaining to a State Office includes files for District and Area Offices within the jurisdiction of that State Office. State Offices also require write access to files of another State Office for entering data about land and mineral resources that lie on a common state boundary.

- District Offices. District Offices require read access to their own files and to the files of any other District Office within the jurisdiction of the

		BLM ACCESS					EXTERNAL ACCESS		PUBLIC ACCESS
		HQ	DSC	State	District	Area	Other Federal Agencies	State & Local Governments	
IN-STATE	STATE	R/S	R/S	R/W	R	R	R	R	R
	DISTRICT	-	-	R	R/W	R	R	R	R
	AREA	-	-	R	R	R/W	R	R	R
OUT-STATE	STATE	R/S	R/S	R/S*	R	R	R	-	R
	DISTRICT	-	-	R	R/S*	R	R	-	R
	AREA	-	-	R	R	R/S*	R	-	R

R= Read Only
W=Write
S= Special Case
S*= Boundary Condition

ALMRS DATA ACCESS REQUIREMENTS

FIGURE IV-5

State Office to which they report. District Offices require write access to data elements and records that pertain to their jurisdiction, including all data of the Area Offices within the jurisdiction of that District Office. District Offices also require write access to files of another District Office for entering data and land and mineral resources that lie on a common district boundary.

- Area Offices. Area Offices require read access to their own files and the files of any other Area Office within the jurisdiction of the District Office to which they report. Area Offices require write access to data elements and records that pertain to their jurisdiction, including those data elements and records of another area office that pertains to a common area boundary.

- External Users. Other Federal agencies require read access to certain data elements in files of any BLM office. State and local governments require read access to certain data elements in files of the offices within their geographical area.

- Public Users. Public users require read only access to certain data elements from files of any BLM office.

(2) Secure Data. Secure data are those that may be accessed only on a "need to know basis" by all user classes. ALMRS will create temporary files of secure data by interfacing to required files through one of the ALMRS functions. Much of the secure data will be extracted from temporary files compiled from external files and systems. Data from certain external files and systems will be considered secure data. Table IV-2 shows the external files and systems that provide ALMRS with secure data.

(3) Proprietary Payment Data. Proprietary data are those that could provide private industry (or public users) with a competitive edge if accessed. ALMRS requires that data about payments for leases or rights-of-way granted to competitors be transferred from the Financial Management System and Simultaneous Oil and Gas Leasing System to ALMRS. These systems contain payment data from private companies.

BLM requires that the data transmitted to ALMRS from these systems and stored in ALMRS be encrypted to prevent legal or illegal access by private companies to proprietary data. Table IV-2 also shows the external files and systems that provide ALMRS with proprietary data.

(4) Classified Data. Classified data are those that require the user to have a security clearance for access. The ALMRS data base, and external files and systems contain classified data pertaining to the Bureau of Indian Affairs. All ALMRS users except Bureau of Indian Affairs users require DOI security clearances to access Bureau of Indian Affairs and other classified data.

(5) User Identification Codes. To satisfy data access and security requirements, all users of ALMRS will be assigned a user identification code that defines user access privileges. These codes will also be used for charge-back billing.

b. Physical Security Requirements. Physical access to ALMRS and its data base depends on the location of equipment and not on user class. ALMRS has different physical security requirements for ADP equipment located in ALMRS computer rooms, in public rooms, and in BLM offices.

Access to ALMRS computer rooms must be restricted by use of door locks and access monitoring. To use ADP equipment, computer room personnel will be required to use physical keys and passwords for system start-up and a separate password to log on to the system. BLM public rooms are required to restrict access to ADP equipment during non-working hours by use of door locks. All BLM internal offices will be required to restrict access to ADP equipment by use of building passes.

C. ALMRS WORKLOAD

This subsection contains ALMRS workload requirements for the ALMRS data base and for external data, and provides estimated volumes of transactions. Estimates of the volume of transactions are based on DSC's estimates of the expected peak loads in 1985. Future workload is expected to increase by 3.5 percent per year compounded during the 12-year ALMRS life cycle. Estimates of the maximum number of transactions generated daily for alphanumeric and spatial graphics inputs and outputs are provided.

1. Volume of ALMRS Hard Copy Output.

Input and output for ALMRS can be estimated for any location based upon the information presented in Table IV-3. This table presents the number of characters of input and output by function for one transaction. Table IV-3 also presents the number of terminal minutes by function needed to complete one transaction. The purpose of this table is to provide estimates of input and output workload by location, and to estimate the amount of time needed for all transactions. The numbers in Table IV-3 should be multiplied by the numbers in Tables A-6, B-1, B-2, or B-3 to produce the total volume of input and output, and the total time needed.

For example, Table A-5 shows that the Arizona State Office workload includes 191 alphanumeric case processing transactions per day. Table IV-3 shows that each case processing transaction requires 650 characters of input. Multiplying 191 transactions per day times 650 characters input per transaction produces 124,150 characters of input per day for cases processed. The number of characters of output per day for case processing can be calculated in the same way.

Approximately 30 percent of all case processing alphanumeric output, 25 percent of all query alphanumeric output, and 80 percent of all management reporting output will be required in hardcopy form.

Approximately 30 percent of all graphics output for query will be required in hardcopy form. Thirty percent of the 30 percent hard copy output will be required as high resolution (plotter) output.

Approximately 50 percent of all graphics output for case processing will be required in hardcopy form. Fifty percent of the 50 percent hard copy output will be required as high resolution (plotter) output.

Less than one percent of all input to ALMRS will require digitization to capture the reference points that comprise a digital representation of the spatial graphics. This should be limited to the capture of Type I surveys for case processing functions.

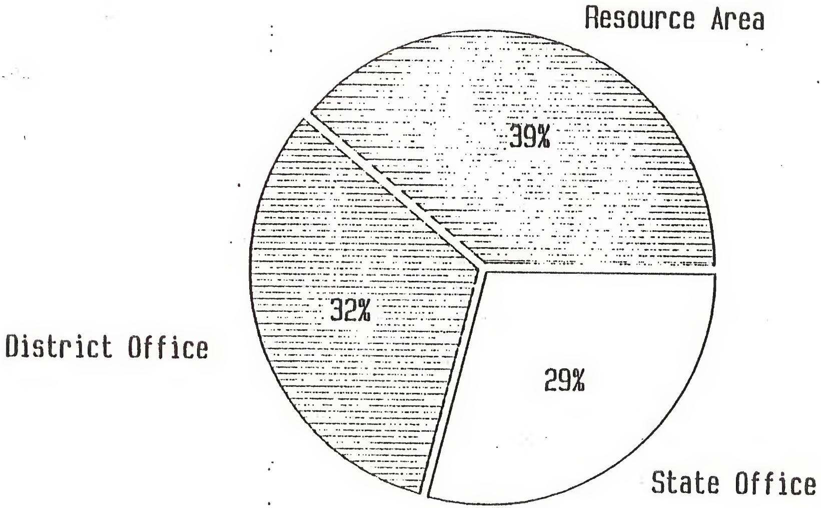
2. Volume of ALMRS Internal Transactions.

Tables B-1 through B-3 in Appendix B show the number of transactions of alphanumeric and graphics data input per day by each BLM office. These tables are summarized in Figures IV-6 through IV-9.

Table B-1 in Appendix B estimates the daily input transactions for the case processing functions for each BLM office. Table B-1 is summarized by office in Figure IV-6 and by state in Figure IV-7. Input requirements were derived from Table 2 of BLM's "ALMRS Requirements Document" dated September 6, 1985.

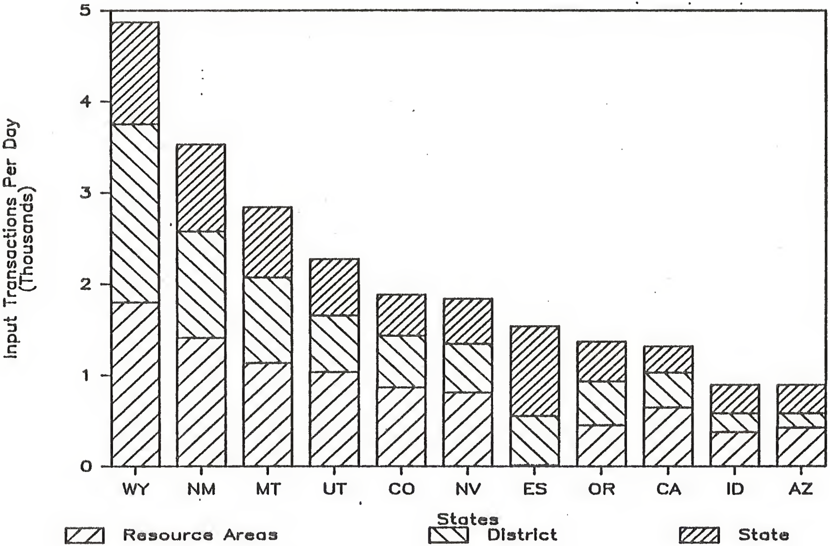
Table A-6 in Appendix A estimates daily input transactions for the management reporting functions. This table presents the current (FY 1985) estimates. BLM does not anticipate any increase in the volume of management reporting over the 12-year life cycle of ALMRS.

Table B-2 in Appendix B estimates the daily input transactions for the alphanumeric query functions. The input transactions reflect the assumption that 80 percent of the query workload will be BLM internal and Public workload. Twenty percent of the workload will be from external users. This workload is identified



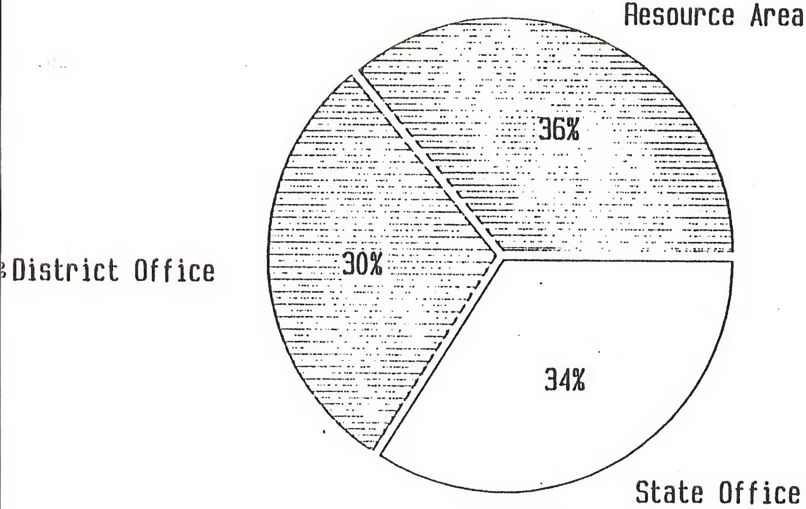
FY 1997 CASE PROCESSING WORKLOAD BY OFFICE

FIGURE IV-6



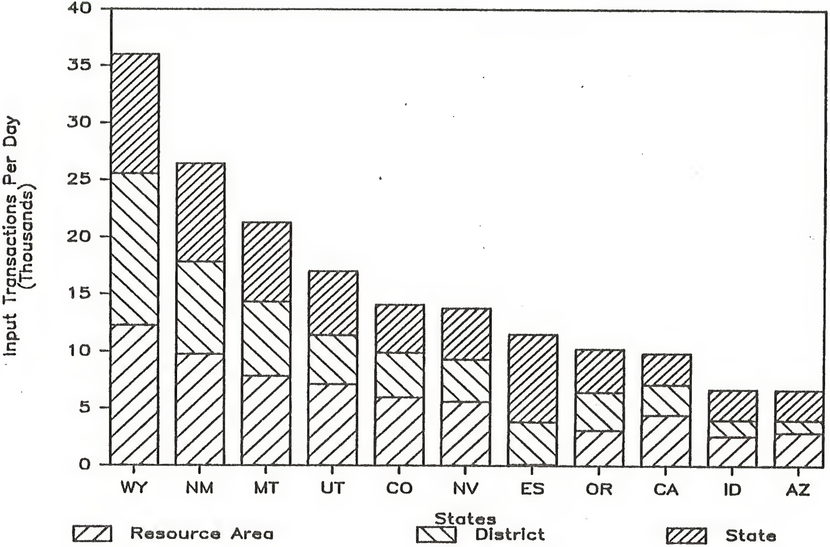
FY 1997 CASE PROCESSING WORKLOAD BY STATE

FIGURE IV-7



FY 1997 QUERY WORKLOAD BY OFFICE

FIGURE IV-8



FY 1997 QUERY WORKLOAD BY STATE

FIGURE IV-9

as "Denver Service Center-Ext" on Table B-2. Input requirements were derived from Algorithm 8 of BLM's "ALMRS Requirements Document" dated September 6, 1985.

Table B-3 in Appendix B estimates the daily input transactions for the graphic query functions. The input transactions reflect the assumption that 80 percent of the query workload will be BLM internal and Public workload. Twenty percent of the workload will be from external users. This workload is identified as "(state) State Office-Ext" on Table B-3. Table B-2 and B-3 are summarized by office in Figure IV-8 and by State in Figure IV-9. Input requirements were derived from Algorithm 8-A of BLM's "ALMRS Requirements Document" dated September 6, 1985.

Figure IV-10 summarizes Tables IV-3, A-6, and B-1 through B-3 and shows that query functions require the highest daily workloads, and that management information reporting functions require the lowest daily workloads.

3. Volume of ALMRS External Data.

ALMRS functions will include interfaces to automated systems and files, which are listed in the left column of Tables IV-4 and IV-5 and described in Section III.B.4. Certain data from these systems and files will be extracted to provide input to ALMRS. Tables IV-4 and IV-5 provide estimates of the maximum number of thousands of characters of daily input to ALMRS by function from external systems and files, and of the maximum number of thousands of characters of daily output from ALMRS functions to external systems and files, respectively.

The data for Table IV-4 and IV-5 were derived from three sources. The first source is the "Future System Document" produced by the DSC in March, 1985. This provided the size of the different interfaced systems and files, found on the Computation Sheet in Module A "Basic Storage Interface and Narrative Description." The size of the interfaces were then multiplied by a percentage of use derived from a meeting between ALMRS Project Office personnel and FEDSIM personnel held in May, 1985. This meeting developed the percentage of each interfaced file and system that must be used by ALMRS functions. This percentage was then multiplied by the size of each system or file to produce the amount of data in those files that is sent to ALMRS. The third source, a meeting between FEDSIM and Denver Service Center Personnel in September, 1985, provided the percentage of growth from the FY 1985 to FY 1997. This percentage of growth was applied to each system to convert the FY 1985 sizes to FY 1997 sizes.

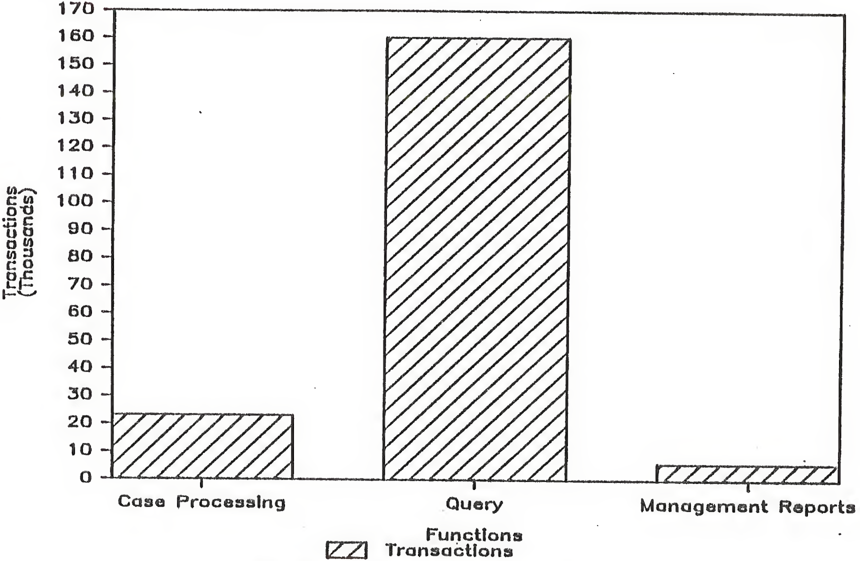
D. ALMRS DATA STORAGE REQUIREMENTS

This subsection presents ALMRS data storage requirements for manual and automated files for the ALMRS twelve year life cycle.

SYSTEMS/FILES	VOLUME OF OUTPUT		
	CASE PROCESSING (CHARACTERS x 1000)	MANAGEMENT REPORTING (CHARACTERS x 1000)	QUERY (CHARACTERS x 1000)
Bond	36	0	0
Surety	0	0	0
Qualification	0	0	0
Financial Management	13,332	0	0
Mineral System 1	17,302	0	0
Solid Leasable Mineral	5,096	0	0
Simultaneous Oil & Gas Leasing	6,163	0	0
Public Land Survey	0	0	0
Bonus & Rental Accounting Support	23,702	0	0
Production Accounting & Auditing	17,776	0	0
Auditing & Financial	37,331	0	0
Total	120,738	0	0

VOLUME OF OUTPUT FROM ALMRS TO EXTERNAL SYSTEMS AND FILES
IN THOUSANDS OF CHARACTERS PER DAY FOR FY 1997

TABLE IV-5



TOTAL TRANSACTIONS BY ALMRS FUNCTION

FIGURE IV-10

1. File Descriptions and Storage Requirements for Manual Files.

BLM will manually maintain case files, survey plats files, control document index files, and reference information files. The files will contain data used by case processing functions. Manual files will be used in ALMRS only by the case processing functions. The current volume of data in manual files is expected to decrease by 25-50 percent over the 12-year ALMRS life cycle. Table IV-6 provides the total volume, measured in cubic feet, of space used to store files manually at each state office. This table shows the FY 1997 storage based upon a fifty percent reduction of the FY 1985 storage requirements. The manual files are described below.

a. Case File. The manual case file is a file folder containing legal instruments and documents supporting case processing and authorizations functions.

b. Survey Plats Files. Survey plats are hard copies of the cadastral survey plats and field notes containing observations, measurements, and monuments of the land. Survey plats are either on paper or microform (fiche, film, or 35 mm aperture cards).

c. Control Document Index Files. The control document index is a collection of hard copy or 35 mm aperture cards containing images of title documents, patents, deeds, orders, and proclamations related to particular land and mineral resources.

d. Reference Information Files. Reference information consists of microfilm images of manual records (such as plats, historical indices, tract books, General Land Office plats, and indexes to mineral locations) as they existed at the time of photocopying for insertion into the files.

The data for Table IV-6 was derived from "Table 4/10," originally provided by Jess Felix of the Washington Office on April 10, 1985. The data provided in that document was for the current system. It was reduced by 50 percent to depict ALMRS manual storage requirements. The 50 percent reduction was developed during a phone call between FEDSIM and ALMRS Project Office in May, 1985.

2. File Descriptions and Storage Requirements for Automated Files.

Each user requires access to certain portions of the ALMRS data base. As defined in Section IV.B.3., each State Office requires access to the data of all District and Area Offices within its jurisdiction. Similarly, each District Office requires access to the data of all area offices within its jurisdiction.

STATES	CASE PROCESSING MANUAL STORAGE (CUBIC FEET)
Arizona	3,050
California	5,155
Colorado	4,765
Eastern States	5,445
Idaho	2,626
Montana	4,960
Nevada	3,128
New Mexico	9,103
Oregon	6,382
Utah	3,615
Wyoming	6,464
Total	54,691

CUBIC FEET REQUIRED FOR MANUAL STORAGE
BY STATE FOR FY 1997

TABLE IV-6

Multiple copies of each ALMRS file are also required to provide back-up in the event of a system failure. Tables B-4 and B-5 in Appendix B provide estimates of the volume of data for automated ALMRS files (i.e., the number of thousands of characters of data that must be stored at each location in order to satisfy data access and back-up requirements).

ALMRS automated files include the Land Description File, the Ownership and Status File, the Serial Number Log File, the Stipulations File, the Regulation Reference File, the Automated Case Data File, the Master Name File, and the Geographic Coordinates File. Each BLM office will require access to certain data elements and records of these internal files.

Tables B-6 and B-7 in Appendix B present total storage requirements by location for the automated data. Storage requirements are presented in two different ways. Table B-6 combines the alphanumeric storage with the unstructured graphics data. This is the format being used in the BLM prototype system. Table B-7 combines the alphanumeric storage with the prestructured graphics data. This is the format currently used by the DOI Geographic Information System. These two tables estimate upper and lower boundaries of the automated data storage requirements. Figure IV-11 summarizes the storage requirements listed in Tables B-6 and B-7.

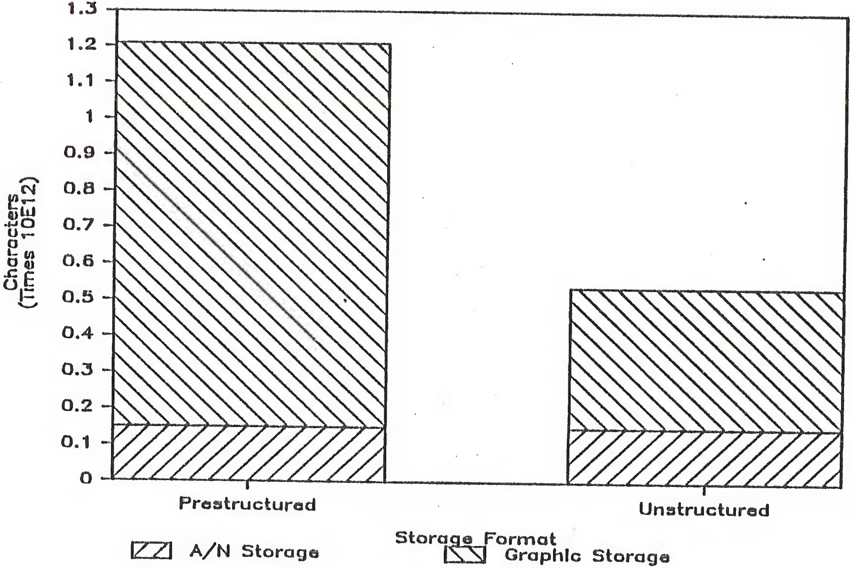
a. Land Description File. The Land Description File will contain data that describe parcels of land as depicted on an official survey plat resulting from a cadastral survey. This file is allocated proportionately to each site and accounted for under the Variable Files column in Table B-4.

(1) Inputs. BLM inputs data from cadastral surveys to the Land Description File. The cadastral survey data consists of legal land descriptions of parcels of land. Approximately one percent of the records in the Land Description File will be updated annually.

(2) Data Elements and File Size. The Land Description File will contain approximately 20 data elements describing geographic political units, parcel numbers, surveys, survey notes, and land attributes. BLM estimates that the file size is 690 million characters.

(3) Outputs. Output from the Land Description File will be alphanumeric and spatial graphics data about legal land descriptions used in all ALMRS functions.

(4) Activity. The activity of this file is based upon the activity of the BLM cadastral surveys. As new surveys are performed, information will be updated. BLM does not expect this file to grow significantly.



TOTAL STORAGE REQUIREMENTS BY STORAGE FORMAT

FIGURE IV-11

b. Ownership and Status File. The Ownership and Status File will contain data that describe ownership, property rights, right of transfer, and availability for Government or private use for a given tract of land or its resources. This file is allocated proportionately to each site and accounted for under the Variable Files column in Table B-4.

(1) Inputs. Data from case files will be used as input to update the Ownership and Status File to reflect changes in land ownership, property rights, and land-use. Approximately five percent of the Ownership and Status File will be updated annually.

(2) Data Elements. The Ownership and Status File will contain approximately 200 data elements describing legal land attributes, geographic political units, financial attributes, ownership, property rights, land-use, and pointers to BLM internal files. BLM estimates that the size of this file is approximately 18 billion characters.

(3) Outputs. Outputs from the Ownership and Status File will be alphanumeric and spatial graphics data providing legal land descriptions for use by all ALMRS functions.

(4) Activity. The activity of this file is based on the activity of the case processing functions. As new cases are processed, information will be updated. BLM expects this file to grow at the rate of 338 million characters per year.

c. Serial Number Log File. The Serial Number Log File will contain identification numbers used by ALMRS offices to track cases. Only portions of this file reside at each site, and the storage requirements for each site are accounted for under the Variable Files column in Table B-4.

(1) Inputs. There are no inputs to this file. The last serial number assigned will be the basis for assignment of the next serial number.

(2) Data Elements. The Serial Number Log File will have two data elements: the prefix to the serial number and the serial number. The prefix will contain six characters. The first two characters of the prefix will identify the geographical state of a case. The next four characters of the prefix will identify the office where the case is being processed (e.g., Colorado State Office) or some types of cases being processed (e.g., mining claim case or grazing case). The serial number portion of the serial number will be the actual six digit serial number assigned to the case. BLM estimates that the file size will be approximately 12 thousand characters. Approximately 30 percent of the records in this file will be updated annually.

(3) Outputs. The output of the Serial Number Log File is the 12-character serial number unique for each case.

(4) Activity. The activity of this file is based upon the activity of the case processing functions. As new cases are processed information will be updated. BLM expects this file to grow at the rate of 3.5 percent per year.

d. Stipulations File. The Stipulations File contains data that describe restrictions that must be considered to determine whether proposed use of federal land should be authorized. Only portions of this file reside at each site, and the storage requirements for each site are accounted for under the Variable Files column in Table B-4.

(1) Inputs. BLM will input data to denote special stipulations derived from regulations' policies and procedures. General stipulations will be in the file prior to the processing of a case; specific stipulations will be added during case processing. Approximately five percent of the data in the Stipulations File will be updated annually.

(2) Data Elements. The Stipulations File will have approximately 16 data elements describing clauses, provisions, case types which use stipulations, and geographical areas where stipulations apply. BLM estimates that the file size is approximately 820 million characters.

(3) Outputs. Output from the Stipulations File will be alphanumeric data that describe stipulations regarding land-use.

(4) Activity. The activity of this file is based upon the activity of the case processing functions. BLM does not expect this file to grow.

e. Regulation Reference File. The Regulation Reference File will contain data about regulations pertaining to land and mineral use, indexed by key words that can be used to locate the regulations. This file is located at Denver Service Center only and is accounted for under the Constant Files column in Table B-4.

(1) Inputs. BLM will input changes to the Regulation Reference File to reflect changes in land and mineral case regulations. Approximately one half percent of the file's data will be updated annually.

(2) Data Elements. The Regulation Reference File will contain one data element describing land and mineral case regulations and keys that index the data. BLM estimates

that the file size is approximately one billion characters.

(3) Outputs. Output from the Regulation Reference File will be alphanumeric abstracts of regulations pertinent to case obtained from key word searches. The output of this file will be similar to output provided by such legal data retrieval systems such as LEXIS and NEXIS.

(4) Activity. The activity of this file is based upon the activity of the case processing functions. BLM does not expect this file to grow significantly.

f. Automated Case Data Files. Automated Case Data files will contain all data from applications for land and resource use, and all data that describe the legal authorizations for use of the land and resource. Only portions of this file reside at each site, and the storage requirements for each site are accounted for under the Variable Files column in Table B-4.

(1) Inputs. BLM will enter all alphanumeric and spatial graphics data contained on applications to create a record in the case file. The Serial Number File will input a serial number for each case. Other case functions will input data that will be used to update the case record to reflect the status of the case and supporting data such as dates, remarks, supplemental action data, numbers relating to actions, names, and interest relationships. Approximately ninety percent of the case files will require annual updating.

(2) Data Elements. Case files will contain approximately 85 data elements, most of which correspond to the data elements on applications. BLM estimates that there will be a total of 2,037,600 cases during the ALMRS life cycle, or 2,037,600 total case records in the case file. Each case record will have approximately 2,138 characters, for a total estimated file size of approximately 4.36 billion characters.

(3) Outputs. The output of this file will be alphanumeric and spatial graphics data about each case record.

(4) Activity. The activity of this file is based upon the activity of the case processing functions. BLM expects this file to grow at 3.5 percent per year compounded.

g. Master Name File. The Master Name File contains data such as the name, address, identification number, category of named entities, ownership interests of ten percent or more in corporations or associations, and other data about each applicant. This file is located at each site and is accounted for under the Constant Files column in Table B-4.

(1) Inputs. BLM inputs data from returns from direct mail contacts and various other automated systems such as Case Recordation, Mining Claims, Bond and Surety, ALMRS Data Entry Files, and other available data files.

(2) Data Elements. The Master Name File will contain about 15 data elements used to describe the name of the entity which is or has done business with BLM or its predecessor agencies. The major subdivisions of this file are Name, Name Identification Number, Address, and Ownership of the named entity when greater than 10 percent. The file size will be approximately 560 million characters comprised of 5 million entries at 112 characters per entry.

(3) Outputs. The output of this file will be alphanumeric data providing all name and address information for use by all ALMRS functions and other systems using this file.

(4) Activity. The activity of this file is based upon the activity of all ALMRS functions. BLM expects this file to grow at less than two percent per year compounded.

h. Geographic Coordinates File. The Geographic Coordinates File contains data representing latitude, longitude, and elevation of federal surface and subsurface lands. A portion of this file is located at each site and is accounted for on Table B-5 in two separate ways. The unstructured graphics column assumes that graphic output will be created only at view time from unstructured graphic and alphanumeric input. The prestructured graphics column assumes that the graphic output will be created in advance of viewing, stored, and displayed when required.

(1) Inputs. BLM inputs data from cadastral surveys, US Geologic Survey Digital Line Graph data, other digitized data sources, and commercially produced data sources. The data consists of surveyed or digitized geographic coordinates. Approximately one percent of the records will be updated annually.

(2) Data Elements. The Geographic Coordinates Data file will contain approximately 60 data elements describing the physical location on the earth's surface for all cadastral survey points. The data elements will describe land and map attributes in a topologically structured graphical form.

(3) Outputs. The outputs from the Geographic Coordinates Data file will be alphanumeric and spatial graphic data

providing topologically accurate descriptions of lands for all ALMRS functions.

(4) Activity. The activity of this file is based upon the activity of all ALMRS functions, especially case processing and query functions. BLM does not expect this file to grow.

3. File Descriptions for External Files.

External files to which ALMRS will be required to interface are: The Geographic Coordinates, Bond, Surety, and Qualification Files. External files are files that are maintained by BLM at DSC, but that are external to ALMRS. Each file is described below:

a. The Geographic Coordinates Cadastral Survey File. The Geographic Coordinates File contains data representing latitude, longitude, and elevation of Federal land.

b. The Bond File. The Bond File contains data on all state and national bonds required by BLM, including: type of bond, state covered, purpose of activity, amount, interest, relationships, and actions and dates.

c. Surety File. The Surety File contains data such as the company name, address, identification, number, interest relationship, and significant dates of all companies issuing bonds.

d. Qualifications File. The Qualifications File contains data such as the names, addresses, and identification numbers of individuals that qualify for lease or land actions.

4. Description of External Systems.

External systems to which ALMRS will be required to interface are: the Financial Management System, the Minerals System I, the Solid Leasable Mineral System, and the Simultaneous Oil and Gas Leasing System. External systems are operated by BLM, but are external to ALMRS. Each external system is described below.

a. The Financial Management System. The Financial Management System contains data describing all collections, payments, and expenditures made in BLM.

b. The Minerals System I. The Minerals System I contains data describing oil and gas leases and inspections.

c. The Solid Leasable Mineral System. The Solid Leasable Mineral System contains data describing federal and Native American solid leasable minerals.

d. The Simultaneous Oil and Gas Leasing System. The Simultaneous Oil and Gas Leasing System contains data describing federal oil and gas resource leases.

5. Descriptions of Files and Systems of External Organizations.

External organizations include organizations involved in the NEPA compliance process or appeals hearings on rejected applications. These organizations maintain files and operate systems to which ALMRS must interface.

The files and systems of external organizations that require interface to ALMRS have not yet been defined.

E. ALMRS PERFORMANCE REQUIREMENTS

1. Turnaround Time.

All user classes require the same turnaround times. Table III-6 in section III.B.3 presents the desired average and maximum number of minutes required under the current system. The current system is not satisfying these turnaround time requirements. One objective of ALMRS is to satisfy these turnaround time requirements.

2. Reliability and Maintainability Requirements.

This subsection defines ALMRS reliability and maintenance requirements, including: operational reliability requirements, logging requirements, journalizing requirements, checkpointing requirements, and maintenance requirements.

a. Operational Reliability Requirements. Operationally reliability requirements have a great impact on final system costs. BLM requires a reliable automated system in order to adequately perform its mission. It is suggested that during the system design phase various operational reliabilities be proposed and costs assigned so that BLM management may make informed decisions about cost effective operational reliability. FEDSIM anticipates ALMRS reliability requirements will be equal to that of normal office automation reliability. Public and external user reliability requirements would be identical and would need to be assessed separately from BLM's requirements.

b. Journalizing Requirements. Journalizing (sometimes referred to as logging) is defined as the recording of all changes to the ALMRS data base. The journal includes copies of all transactions, data before and after record update, the time the transaction occurred, the user and terminal identification, and indications of security breaches. A transaction to the data base is defined as an update to the data base (including changes, additions, and deletions). ALMRS requires that each data base transaction be journalized and that the journal be analyzed to identify questionable transactions.

c. Checkpointing Requirements. Checkpointing is defined as the recording of data onto nonvolatile storage media at checkpoints during data entry or processing to permit processing to be reinitiated from that point in time. ALMRS requires that system checkpointing be performed.

d. Preventive and Corrective Maintenance. ALMRS will require preventive and corrective maintenance. Preventive maintenance involves periodic checks of system components and schedules for replacement of system components to minimize the probability of system failure. Corrective maintenance involves replacement or repair of failed system units. Due to the remote locations of many BLM offices special care should be taken to assure that preventative maintenance is performed frequently. This should minimize the need for corrective maintenance at all sites but especially at those sites more difficult to service.

V. PROPOSED SYSTEM

The proposed ALMRS system is based on a distributed configuration using hardware purchased through a competitive procurement process. The rationale for purchasing rather than leasing appears in Appendix C, and the rationale for excluding other alternatives appears in Appendix D.

The software development effort includes research and development, and prototype activities to provide state-of-the-art spatial graphics that satisfy ALMRS requirements. This approach will minimize data storage by computing topological relationships and employing other data compression techniques. The rationale for eliminating other hardware acquisition and software development approaches is documented in Section VI and supporting appendices. The following subsections describe the proposed system and its life cycle costs and benefits.

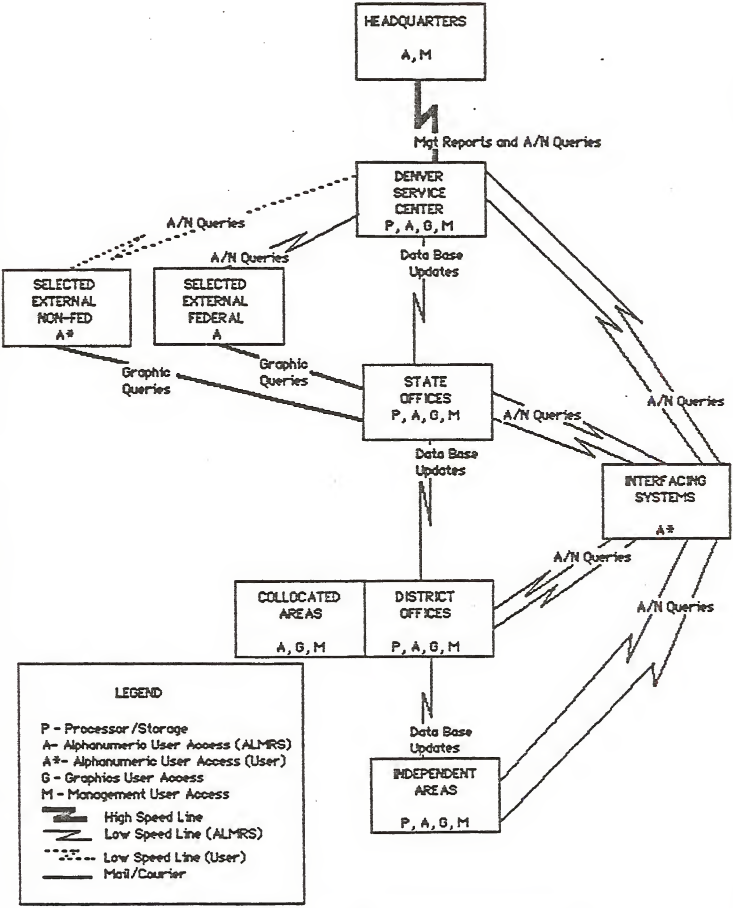
A. DESCRIPTION

The proposed ALMRS system configuration is shown in Figure V-1. This configuration is proposed for costing purposes appropriate for initiation phase activities. The proposed configuration should not be used to limit future vendor offerings for ALMRS procurement. BLM should acquire the necessary configurations via a fully competitive procurement with an RFP based on functional requirements.

Processors and disk storage will be located at 136 sites: the Denver Service Center (DSC), 11 state offices, 53 district offices, and 71 area offices that are not collocated with districts. Collocated area offices will use the processor/storage capabilities of the parent district. All offices will have alphanumeric access devices (terminals, printers), graphics access devices (terminals, plotters, hardcopy, digitizers), and management access devices (personal computers). Each independent area, district, and state office will be connected to the site above and below it in the organizational hierarchy. This connection will be achieved by a 4800 or 9600 bits per second (bps) dedicated line which will be used for transmitting data base changes on a scheduled basis.

The connection between Headquarters and the DSC will be via a high capacity, 56 thousand bits per second (Kbps) dedicated line. This will provide for transmission of the large volume of management reporting data from the DSC to Headquarters and will also support alphanumeric queries.

Each of the 136 sites will also have one incoming and one outgoing dial-up line for exchanging data with interfacing systems. Terminals used to access ALMRS from these interfacing sites will be provided by the user organization.



PROPOSED ALMRS SYSTEM CONFIGURATION
FIGURE V-1

In the initial implementation, ALMRS will support 31 selected external Federal agency organizations. Alphanumeric queries will be submitted by these agencies to the DSC using terminals, printers, and low speed dedicated communications capabilities provided by ALMRS. Graphics queries from these users will be processed using ALMRS graphics devices located at state offices. The resultant outputs will be sent to the initiators via mail or courier. In addition, 19 selected non-federal organizations (e.g., state and local governments) will be supported in a similar fashion. However, these organizations will provide the terminals, printers, and communications lines needed to access the DSC.

The proposed distributed approach is consistent with ALMRS system availability requirements. Sophisticated reliability assurance techniques (e.g., complete component redundancy) are not appropriate for ALMRS. However, the system must provide a level of availability associated with a typical ADP business environment in which there is a moderate operational impact in the case of system failures, and losses due to failures are recoverable.

The distributed approach supports availability because multiple online copies of data bases exist. For example, if an area office computer or disk storage subsystem fails, that office can still operate in a degraded mode by using the communications line to the district office to access the copy of the data base at the district. The high speed lines which represent a single point failure in other configuration alternatives are eliminated in the distributed approach. The low speed lines included in the proposed system do not represent a critical system component. If the communication lines fail, the data base updates can be transferred between offices by transmitting magnetic tapes via messenger.

B. COSTS

FEDSIM developed a life cycle cost estimate for the proposed system using the methodology presented in FIPS PUB 64. FEDSIM used unit prices available in the current marketplace as the basis for cost estimation. The cost estimates include features to enhance availability. For example, the costs for disk storage are based on the use of multiple disks with dual access paths to the processor. In addition, each site includes at least two graphic output devices (at least one plotter and one hardcopy device), at least two devices which can perform alphanumeric print (main printer and management terminal printer), and multiple terminals.

Appendix E describes the result of the Technology Survey performed to identify and evaluate ALMRS alternatives. Appendix E followed a conservative approach to costing ADP hardware components based on the assumption that ADP equipment costs will continue to decrease as a result of technological advances.

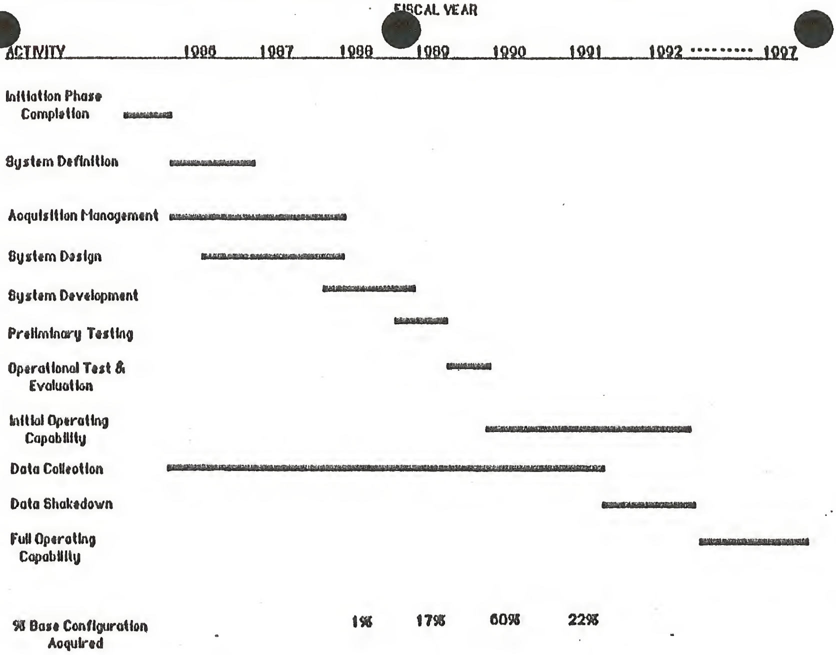
FEDSIM selected a twelve-year period as the ALMRS life cycle for the purpose of analysis. This period is appropriate for a system with the developmental scope of ALMRS and provides for an operational cycle slightly longer than the development period. The eight-year life cycle classically used for systems with limited development periods is not appropriate for ALMRS, since it would yield only three years of full operation after a five-year development period. Such a short operational period is unrealistic for a system with five years of heavy investment.

To estimate costs by year over the life cycle, FEDSIM developed the ALMRS schedule shown in Figure V-2. This schedule was developed and refined based on milestone charts developed by BLM. The schedule in Figure V-2 is generally consistent with BLM milestones but includes a longer period to complete the activities through system development. This longer period is consistent with the magnitude of the ALMRS development effort.

The ALMRS schedule shown in Figure V-2 indicates that ALMRS system design will be complete by the end of FY 1987. The ALMRS schedule has acquisition management activities being conducted in parallel with system design so that an appropriate configuration (and, if deemed appropriate, contractor development support) is selected prior to the start of system development.

The ALMRS schedule has system development activities being conducted in FY 1988. Approximately 1 percent of the total configuration will be required to provide an appropriate development environment. The ALMRS schedule has preliminary system test and operational test and evaluation activities being conducted during FY 1989. According to the ALMRS schedule configurations will be installed throughout the two ALMRS priority data collection states (New Mexico and Arizona) in FY 1989. This will require an additional acquisition of approximately 17 percent of the total base configuration (a lower percentage of terminals will be acquired). This test period is necessary to ensure that the ALMRS system meets all specified requirements prior to the significant commitment of funds needed to install ADP hardware at all BLM offices.

The ALMRS schedule has capabilities being installed throughout six additional states in FY 1990. This will be the major year for configuration acquisition expenditures with an estimated outlay of 60 percent of the total funds to be expended. Capabilities for the remaining states and the Washington Office will be installed in FY 1991. Throughout the acquisition period, the configuration at DSC will be expanded to provide backup for states that become operational. BLM plans to complete data collection by mid FY 1991. This will be followed by a one-year data shakedown period. The ALMRS schedule has full operating capability planned for mid FY 1992.



ALMRS SCHEDULE/PROPOSED SYSTEM

FIGURE V-2

After developing the ALMRS life cycle schedule, FEDSIM established the cost categories to be included in the estimates. FEDSIM used FIPS PUB 64 as a starting point and expanded the general categories presented to reflect specific ALMRS cost elements. The resultant cost elements are shown in Table V-1.

FEDSIM then established cost factors needed to develop the life cycle cost estimates. The resultant factors are shown in Table V-2. The following paragraphs describe the format of the table.

The rows of the table present line entries for each major cost line item (cost element). As shown, these are grouped into four major categories:

- System Development
- System Configuration
- Communications
- Operations

For each cost element, the associated quantity and unit are shown. For personnel line items, the unit is man-months (M/M). For other elements, the unit varies depending on the nature of the element. The next column provides the undiscounted unit cost associated with the cost element. For example, if $8,000 is associated with a personnel cost element, each man-month costs $8,000. The fourth column, "DISCOUNT," presents the discount percentage that is estimated for the cost element based on expected reductions through quantity acquisition and/or competitive procurement.

The entries under "COST % FISCAL YEAR" allocate the costs of the line item by fiscal year. For non-recurring costs including capital investment, the percentages total 100. The breakdown shown in these cases represents the spreading of costs over time as resources are acquired on an incremental basis. For recurring costs, such a buildup can also exist; however, it is generally followed by additional years in which 100 percent of the cost continues to occur.

These factors were used to develop the actual cost estimates by year. The life cycle cost estimate is shown in Table V-3. The entries in each cell of the table represent the yearly costs for each element. These entries generally are the product of:

- QUANTITY
- UNIT $

LINE ITEM	COST ELEMENT
1.	SYSTEM DEVELOPMENT
1.a	INITIATION PHASE COMPLETION
1.b	SYSTEM DEFINITION
1.c	ACQUISITION MANAGEMENT
1.d	SYSTEM DESIGN
1.e	SYSTEM DEVELOPMENT/TEST
2.	SYSTEM CONFIGURATION
2.a	PROCESSOR-TYPE A
2.b	PROCESSOR-TYPE B
2.c	PROCESSOR-TYPE C
2.d	DISK STORAGE
2.e	OFFLINE BACKUP
2.f	GRAPHICS TERMINAL
2.g	DIGITIZER
2.h	PLOTTER
2.i	GRAPHICS HARDCOPY
2.j	ALPHANUMERIC TERMINAL
2.k	ALPHANUMERIC HARDCOPY
2.l	MANAGEMENT TERMINAL/OUTPUT
2.m	RESIDUAL VALUE
3.	COMMUNICATIONS
3.a	BLM VOICE GRADE INVEST
3.b	BLM VOICE GRADE RECUR
3.c	DIAL UP INVEST
3.d	DIAL UP RECUR
3.e	DSC-HQ HIGH SPEED INVEST
3.f	DSC-HQ HIGH SPEED RECUR
3.g	EXT VOICE GRADE INVEST
3.h	EXT VOICE GRADE RECUR
4.	OPERATIONS
4.a	DATA COLLECTION-GEOGRAPHIC
4.b	DATA COLLECTION-OTHER
4.c	SITE PREPARATION-TYPE A
4.d	SITE PREPARATION-TYPE B
4.e	SITE PREPARATION-TYPE C
4.f	TRAINING
4.g	OPERATIONS PERSONNEL
4.h	SPACE LEASE/UTILITIES-TYPE A
4.i	SPACE LEASE/UTILITIES-TYPE B
4.j	SPACE LEASE/UTILITIES-TYPE C
4.k	SUPPLIES-GRAPHICS
4.l	SUPPLIES-ALPHANUMERIC
4.m	SYSTEM CONFIGURATION MAINTENANCE
4.n	APPLICATION SOFTWARE MAINTENANCE

COST ELEMENTS INCLUDED IN THE ANALYSIS

TABLE V-1

COST ELEMENT	QUANTITY	UNIT $	DISCOUNT	COSTS FISCAL YEAR 1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
1. SYSTEM DEVELOPMENT															
1.a INITIATION PHASE COMPLETION	10 M/M	$6,000		100%											
1.b SYSTEM DEFINITION	100 M/M	$6,000		100%											
1.c ACQUISITION MANAGEMENT	113 M/M	$6,000		85%	33%										
1.d SYSTEM DESIGN	803 M/M	$8,000			100%										
1.e SYSTEM DEVELOPMENT/TEST	1083 M/M	$7,000				00%	00%								
2. SYSTEM CONFIGURATION			01%												
2.a PROCESSOR-TYPE A	30 CPU	$250,000	00%			1%	17%	00%	31%						
2.b PROCESSOR-TYPE B	60 CPU	$133,000	00%			1%	10%	60%	33%						
2.c PROCESSOR-TYPE C	30 CPU	$73,000	00%			1%	10%	A0%	33%						
2.d DISK STORAGE	330 GBYTE	$42,000	00%			1%	10%	60%	33%						
2.e OFFLINE BACKUP	1 SES	$133,000	00%					100%							
2.f GRAPHICS TERMINAL	3000 UNIT	$30,000	50%			1%	13%	07%	30%	0%	3%	3%	3%	3%	3%
2.g DIGITIZED	106 UNIT	$2,500	00%			1%	17%	10%	33%						
2.h PLOTTER	309 UNIT	$22,000	00%			1%	17%	A0%	12%						
2.i GRAPHICS HARDCOPY	309 UNIT	$3,000	00%			1%	10%	A0%	10%						
2.j ALPHANUMERIC TERMINAL	1000 UNIT	$2,000	30%			1%	13%	07%	30%	0%	3%	3%	3%	3%	3%
2.k ALPHANUMERIC HARDCOPY	100 UNIT	10,000	00%			0%	17%	60%	01%						
2.l MANAGEMENT TERMINAL/OUTPUT	300 UNIT	$0,300	00%			1%	17%	A0%	32%						
2.m RESIDUAL VALUE															
3. COMMUNICATIONS															
3.a OLN VOICE GRADE INVEST	1 NET	$0A3,300	00%			0%	13%	A0%	31%						
3.b OLN VOICE GRADE RECUR	1 NET	$031,000	00%			1%	10%	70%	100%	100%	100%	100%	100%	100%	100%
3.c DIAL UP INVEST	1 NET	$071,000	00%			1%	10%	60%	12%						
3.d DIAL UP RECUR	1 NET	$0,320,000	40%			1%	10%	70%	100%	100%	100%	100%	100%	100%	100%
3.e DSC-HQ HIGH SPEED INVEST	1 LINE	$183,000	40%						100%						
3.f DSC-HQ HIGH SPEED RECUR	1 LINE	$00,000	00%						100%	100%	100%	100%	100%	100%	100%
3.g EIT VOICE GRADE INVEST	1 NET	$210,600	00%			1%	17%	60%	10%						
3.h EIT VOICE GRADE RECUR	1 NET	$103,000	00%			1%	10%	10%	100%	100%	100%	100%	100%	100%	100%
4. OPERATIONS															
4.a DATA COLLECTION-GEOGRAPHIC	1 PROJ	$10,000,000			10%	31%	33%	31%	0%						
4.b DATA COLLECTION-OTHER	1 PROJ	$33,000,000		10%	39%	34%	11%	10%	3%						
4.c SITE PREPARATION-TYPE A	30 SITE	$32,000				1%	17%	A0%	33%						
4.d SITE PREPARATION-TYPE B	80 SITE	$10,000				1%	07%	00%	33%						
4.e SITE PREPARATION-TYPE C	30 SITE	$13,000				1%	17%	10%	33%						
4.f TRAINING	310 USER	$1,000				0%	17%	A0%	30%						
4.g OPERATIONAL PERSONNEL	00 FTE	$30,000				1%	10%	10%	100%	100%	100%	100%	100%	100%	100%
4.h SPACE LEASE/UTILITIES-TYPE A	30 SITE	$12,300				1%	10%	70%	103%	100%	100%	100%	100%	100%	100%
4.i SPACE LEASE/UTILITIES-TYPE B	80 SITE	$9,000				1%	10%	10%	100%	100%	100%	100%	100%	100%	100%
4.j SPACE LEASE/UTILITIES-TYPE C	10 SITE	$4,000				1%	10%	70%	100%	100%	100%	100%	100%	100%	100%
4.k SUPPLIES-GRAPHICS	3.2 MPAGE	$000,000	00%			1%	10%	11%	01%	05%	00%	91%	00%	91%	100%
4.l SUPPLIES-ALPHANUMERIC	30.0 MPAGE	$10,000	00%			1%	10%	61%	01%	00%	00%	01%	00%	97%	100%
4.m SYSTEM CONFIGURATION MAINT	SUNV I														
4.n APPLICATION SOFTWARE MAINT	40 M/M	10,000							100%	100%	100%	100%	100%	100%	100%

COST FACTORS-PROPOSED SYSTEM

TABLE V-2

- 1-DISCOUNT % (1 MINUS discount percentage)
- COST.% FISCAL YEAR

The final column is the sum of the yearly costs for each cost element.

Various totals are also included in Table V-3. The first row in each of the four major cost categories shows the total for all elements in the category. Summaries are also provided of capital investment, other non-recurring, and recurring costs as defined in FIPS PUB 64. The cost elements included in each of these groups are identified in Table V-4. Total costs in terms of yearly dollars and present value (FY 1985) dollars are also shown. The 10 percent discount factor identified in OMB Circular A-94 was used in the present value (discounted cash flow) analysis.

The residual value of the system configuration was calculated and subtracted from the expenditures in the final year of the life cycle. A factor of 10 percent of the system configuration cost was used for residual value. This figure is typical of the remaining value of equipment after eight years of operation. This factor was previously used as a basis in GSA guidelines, and a residual value forecast for typical hardware (IBM) published in the February 1985 issue of "Computer Economics" indicates that the factor is consistent with industry forecasts.

The following subsections present the rationale FEDSIM developed for estimating the costs of the proposed system. The sections correspond to the labels shown on Table V-3 for each cost element.

1. System Development

The System Development category includes all personnel-based cost elements needed to complete the definition, design, and development of an ALMRS capability. It also includes the acquisition management activities associated with procuring the configuration and other services needed to implement ALMRS. The ALMRS schedule (Figure V-2) indicates that the costs for system development will occur between FY 1986 and FY 1989.

In the proposed system approach, BLM will fund activities to develop software that provides state-of-the-art spatial graphics processing. Emphasis will be placed on improved techniques for data compression and presentation, including mixed graphics and alphanumerics. The technique of calculating topological structures rather than using a pre-structured topological storage approach is a key aspect of the proposed system. Cost estimates include the research and development efforts needed to implement this technique. The following paragraphs address each cost

COST ELEMENT						COST FISCAL YEAR							TOTAL
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	
1. SYSTEM DEVELOPMENT	$1,414,000	$2,797,480	$9,749,000	$4,144,000	$0	$0	$0	$0	$0	$0	$0	$0	$18,087,000
1.a INITIATION PHASE COMPLETION	$199,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$199,000
1.b SYSTEM DEFINITION	$969,998	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$969,800
1.c ACQUISITION MANAGEMENT	$906,040	$697,990	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$904,000
1.d SYSTEM DESIGN	$0	$2,290,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$2,996,000
1.e SYSTEM DEVELOPMENT/TEST	$0	$0	$7,749,000	$5,144,000	$0	$0	$0	$0	$0	$0	$0	$0	$13,915,000
2. SYSTEM CONFIGURATION	$0	$0	$700,000	$11,492,910	$41,460,740	$14,950,960	$1,414,000	$1,220,100	$1,220,100	$1,220,100	$1,220,100	($6,075,040)	$60,396,200
2.a PROCESSOR-TYPE A	$0	$0	$97,760	$1,955,456	$4,090,000	$1,675,176	$0	$0	$0	$0	$0	$0	$6,796,600
2.b PROCESSOR-TYPE B	$0	$0	$94,090	$1,112,090	$2,960,000	$1,452,000	$0	$0	$0	$0	$0	$0	$6,690,000
2.c PROCESSOR-TYPE C	$0	$0	$10,960	$104,600	$490,000	$337,400	$0	$0	$0	$0	$0	$0	$1,090,000
2.d DISK STORAGE	$0	$0	$144,160	$1,060,098	$9,713,496	$3,195,710	$0	$0	$0	$0	$0	$0	$14,444,000
2.e OFFLINE BACKUP	$0	$0	$0	$0	$92,000	$0	$0	$0	$0	$0	$0	$0	$92,000
2.f GRAPHICS TERMINAL	$0	$0	$100,590	$1,050,500	$10,250,000	$7,770,000	$1,334,010	$1,440,000	$1,140,500	$1,140,000	$1,140,500	$1,145,500	$30,050,000
2.g DIGITIZER	$0	$0	$2,060	$14,400	$112,400	$44,090	$0	$0	$0	$0	$0	$0	$184,000
2.h PLOTTER	$0	$0	$24,010	$444,074	$1,100,090	$810,310	$0	$0	$0	$0	$0	$0	$2,403,000
2.i GRAPHICS HARDCOPY	$0	$0	$18,070	$449,760	$951,300	$349,190	$0	$0	$0	$0	$0	$0	$1,807,000
2.j ALPHANUMERIC TERMINAL	$0	$0	$10,200	$224,400	$855,090	$244,000	$92,000	$54,400	$54,400	$54,400	$50,400	$50,400	$1,610,090
2.k ALPHANUMERIC HARDCOPY	$0	$0	$17,044	$197,112	$1,190,160	$414,102	$0	$0	$0	$0	$0	$0	$1,902,400
2.l MANAGEMENT TERMINAL/OUTPUT	$0	$0	$9,401	$157,774	$496,710	$100,104	$0	$0	$0	$0	$0	$0	$920,400
2.m RESIDUAL VALUE												($7,010,190)	($7,010,190)
3. COMMUNICATIONS	$0	$0	$41,001	$404,000	$1,494,314	$1,701,114	$1,444,410	$1,440,010	$1,440,410	$1,440,430	$1,440,430	$1,090,018	$11,444,170
3.a OLM VOICE GRADE INVEST	$0	$0	$8,143	$97,301	$111,040	$110,294	$0	$0	$0	$0	$0	$0	$317,200
3.b OLM VOICE GRADE RECUR	$0	$0	$5,017	$90,110	$491,294	$501,760	$501,790	$501,710	$501,710	$501,720	$501,710	$501,710	$3,990,700
3.c DIAL UP INVEST	$0	$0	$4,440	$17,702	$77,774	$24,041	$0	$0	$0	$0	$0	$0	$123,960
3.d DIAL UP RECUR	$0	$0	$7,344	$131,314	$594,114	$714,100	$714,300	$714,300	$714,400	$714,300	$714,190	$744,100	$5,067,316
3.e OSC-HQ HIGH SPEED INVEST	$0	$0	$0	$0	$0	$92,090	$0	$0	$0	$0	$0	$0	$92,000
3.f OSC-HQ HIGH SPEED RECUR	$0	$0	$0	$0	$0	$39,490	$34,390	$34,090	$34,040	$34,390	$34,090	$34,040	$255,700
3.g EXT VOICE GRADE INVEST	$0	$0	$4,970	$34,017	$110,454	$44,407	$0	$0	$0	$0	$0	$0	$194,760
3.h EXT VOICE GRADE RECUR	$0	$0	$1,791	$90,414	$132,734	$170,140	$170,140	$170,140	$170,190	$170,140	$170,140	$170,040	$1,366,175
4. OPERATIONS	$4,442,010	$8,411,000	$18,105,215	$13,067,494	$17,901,007	$10,265,019	$11,360,102	$11,321,073	$11,630,091	$11,770,078	$19,704,091	$12,030,040	$100,107,491
4.a DATA COLLECTION-GEOGRAPHIC	$0	$7,790,000	$4,760,000	$8,270,000	$4,370,000	$4,390,000	$0	$0	$0	$0	$0	$0	$27,060,000
4.b DATA COLLECTION-OTHER	$4,441,090	$7,311,090	$4,214,090	$4,144,000	$2,360,000	$779,090	$0	$0	$0	$0	$0	$0	$24,700,000
4.c SITE PREPARATION-TYPE A	$0	$0	$7,490	$161,400	$941,000	$440,490	$0	$0	$0	$0	$0	$0	$710,090
4.d SITE PREPARATION-TYPE B	$0	$0	$17,440	$199,900	$1,044,060	$107,900	$0	$0	$0	$0	$0	$0	$1,760,000
4.e SITE PREPARATION-TYPE C	$0	$0	$2,400	$94,900	$914,000	$77,100	$0	$0	$0	$0	$0	$0	$960,000
4.f TRAINING	$0	$0	$5,900	$44,140	$414,000	$140,300	$0	$0	$0	$0	$0	$0	$560,000
4.g OPERATIONS PERSONNEL	$0	$0	$34,400	$440,000	$1,994,000	$1,440,000	$2,340,000	$2,340,000	$1,440,060	$1,040,000	$2,340,000	$2,040,000	$20,904,600
4.h SPACE LEASE/UTILITIES-TYPE A	$0	$0	$2,290	$90,940	$359,760	$499,090	$314,000	$319,090	$444,090	$314,000	$314,090	$394,090	$3,301,100
4.i SPACE LEASE/UTILITIES-TYPE B	$0	$0	$7,490	$149,300	$417,760	$794,000	$709,099	$949,000	$701,000	$492,040	$772,010	$771,000	$4,111,160
4.j SPACE LEASE/UTILITIES-TYPE C	$0	$0	$1,433	$99,174	$197,166	$166,900	$149,208	$162,100	$142,200	$162,100	$161,490	$162,100	$1,300,706
4.k SUPPLIES-GRAPHICS	$0	$0	$2,100	$49,390	$192,968	$167,300	$170,100	$170,090	$207,400	$190,790	$400,490	$310,040	$1,944,190
4.l SUPPLIES-ALPHANUMERIC	$0	$0	$4,044	$30,094	$195,904	$147,100	$174,440	$104,433	$107,044	$144,014	$100,300	$404,900	$1,497,090
4.m SYSTEM CONFIGURATION MAINT	$0	$0	$71,019	$1,103,044	$4,974,497	$4,479,907	$4,417,142	$4,741,011	$6,052,470	$4,763,710	$7,070,492	$7,190,950	$39,147,307
4.n APPLICATION SOFTWARE MAINT	$0	$0	$19	$0	$0	$990,996	$400,000	$900,000	$600,090	$400,000	$900,009	$900,000	$3,340,090
TOTAL CAPITAL INVESTMENT	$0	$0	$709,304	$14,791,721	$42,190,251	$14,414,092	$1,444,000	$1,220,100	$1,210,100	$1,120,100	$1,210,100	($4,365,048)	$71,177,100
TOTAL OTHER NON-RECURRING	$4,074,040	$12,190,109	$10,960,060	$14,154,940	$9,799,000	$2,091,440	$0	$0	$0	$0	$0	$0	$44,155,000
TOTAL RECURRING	$0	$0	$124,534	$1,140,471	$9,197,071	$11,440,074	$14,090,749	$12,744,712	$12,044,704	$12,442,491	$12,230,491	$12,470,470	$109,497,090
TOTAL ALL COSTS	$4,074,090	$12,190,400	$14,957,009	$30,109,449	$60,390,044	$31,444,482	$14,465,494	$14,194,014	$14,919,404	$19,496,791	$14,376,701	$8,104,440	$196,941,440
**********	************	************	************	************	************	************	************	************	************	************	************	************	************
PRESENT VALUE FACTOR	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467	0.424	0.386	0.350	0.317	
T VALUE COST	$3,713,011	$10,065,194	$14,917,067	$20,563,368	[illegible]	$18,265,993	$7,491,258	$6,627,391	$6,070,164	$5,397,744	$5,104,430	[illegible]	$140,605,789

I-PROPOSED SYSTEM

LINE ITEM	COST ELEMENT
	CAPITAL INVESTMENT COSTS
2.a	PROCESSOR-TYPE A
2.b	PROCESSOR-TYPE B
2.c	PROCESSOR-TYPE C
2.d	DISK STORAGE
2.e	OFFLINE BACKUP
2.f	GRAPHICS TERMINAL
2.g	DIGITIZER
2.h	PLOTTER
2.i	GRAPHICS HARDCOPY
2.j	ALPHANUMERIC TERMINAL
2.k	ALPHANUMERIC HARDCOPY
2.l	MANAGEMENT TERMINAL/OUTPUT
2.m	RESIDUAL VALUE
3.a	BLM VOICE GRADE INVEST
3.c	DIAL UP INVEST
3.e	DSC-HQ HIGH SPEED INVEST
3.g	EXT VOICE GRADE INVEST
	OTHER NON-RECURRING COSTS
1.a	INITIATION PHASE COMPLETION
1.b	SYSTEM DEFINITION
1.c	ACQUISITION MANAGEMENT
1.d	SYSTEM DESIGN
1.e	SYSTEM DEVELOPMENT/TEST
4.a	DATA COLLECTION-GEOGRAPHIC
4.b	DATA COLLECTION-OTHER
4.c	SITE PREPARATION-TYPE A
4.d	SITE PREPARATION-TYPE B
4.e	SITE PREPARATION-TYPE C
4.f	TRAINING
	RECURRING COSTS
3.b	BLM VOICE GRADE RECUR
3.d	DIAL UP RECUR
3.f	DSC-HQ HIGH SPEED RECUR
3.h	EXT VOICE GRADE RECUR
4.g	OPERATIONS PERSONNEL
4.h	SPACE LEASE/UTILITIES-TYPE A
4.i	SPACE LEASE/UTILITIES-TYPE B
4.j	SPACE LEASE/UTILITIES-TYPE C
4.k	SUPPLIES-GRAPHICS
4.l	SUPPLIES-ALPHANUMERIC
4.m	SYSTEM CONFIGURATION MAINTENANCE
4.n	APPLICATION SOFTWARE MAINTENANCE

FIPS PUB 64 COST ELEMENT GROUPS

TABLE V-4

element in this category. All costs shown are for man-months of labor required in addition to those expended by the ALMRS project staff.

a. Initiation Phase Completion. The initiation phase of ALMRS is already underway, and a large portion of the efforts in this phase were accomplished in FY 1985. In the first quarter of FY 1986, the initiation phase will be completed. Updates and refinements will be made to finalize requirements documents, alternatives analyses, technology assessments, and cost/benefit analyses. FEDSIM estimates that 18 man-months of effort at $8,000 per man-month will be required for initiation phase completion.

b. System Definition. The ALMRS schedule presented in Figure V-2 has system definition activities being conducted during the last three quarters of FY 1986. The following products will be prepared during this phase:

- Detailed requirements statement
- Systems specification
- Software development strategy
- Concept of operations
- Data requirements document
- Test plan

Previously developed documentation such as the cost/benefit analysis and technology study will also be revised during this phase.

The ALMRS schedule (Figure V-2) also shows the initial phases of the ALMRS prototype activity being conducted during this period. The concept of calculated graphics will be demonstrated using small data base samples (between 10 and 30 townships). The results of the initial prototype will form a key input to system definition products. FEDSIM estimates that 108 man-months of effort at $8,000 per man-month will be required to complete system definition activities.

c. Acquisition Management. The ALMRS schedule (Figure V-2) shows acquisition management activities being started in mid FY 1986 so that a configuration and related services can be selected during the system design activity and installed prior to system development/programming. The first step in this activity will be defining an acquisition strategy to determine:

- Capabilities/services to be acquired versus those provided as "Government Furnished"

- The number of separate procurements to be conducted

- General criteria for vendor selection

The following products will then be prepared:

- Agency Procurement Request

- Request for Proposal

- Evaluation Plan

- Benchmark Plan

Thereafter, proposals will be evaluated, benchmarks will be run, and negotiations will be conducted. FEDSIM estimates that 113 man-months of effort at $8,000 per man-month will be required. This estimate includes acquisition management activities needed to support the prototype effort.

d. System Design. System design will be conducted throughout FY 1987. During this period, such documents as detail design requirements, data base specifications, and computer program specifications will be developed. All previously developed documentation will be updated as required. FEDSIM estimates that detailed system design will require 405 man-months of effort at $8,000 per man-month.

e. System Development. Coding and unit test will be accomplished during FY1988. Preliminary testing and operational test and evaluation will be conducted in FY 1989. FEDSIM estimates that these efforts will require 1,845 man-months at $7,000 per man-month. This lower man-month cost is based on the use of a less senior mix of personnel during actual coding activities.

In preparing the base case estimates for system design and system development, FEDSIM assumed that:

- BLM will be involved in state-of-the-art graphics software development to improve existing data storage and presentation technologies.

- Vendor packages used as the basis for ALMRS development will become part of a turnkey software system, and BLM will not have to pay a per unit cost for the packages.

- Approximately 200,000 lines of code will be written. (As a point of reference, GIS's Core Map overlay and statistical system [MOSS] software totals over 300,000 lines of code).

FEDSIM used these assumptions as input to algorithms published by Barry W. Boehm in his book Software Engineering Economics. Using Boehm's algorithms for an embedded development mode (heavy coupling of hardware, software, procedures, personnel), FEDSIM estimates that a total of 2250 man-months will be required to implement the system. This estimate includes multipliers to adjust Boehm's intermediate level model to account for ALMRS data base size (very high), product complexity (high) and development schedule criticality (high). Based on experience data presented by Boehm, the following percentages, by phase, can be expected:

- System Design 18 percent
- Programming/Unit Test 48 percent
- System Test 34 percent

These percentages were used by FEDSIM to allocate the 2,250 man-months across the System Design (Cost Element 1.d) and System Development (Cost Element 1.e) cost elements.

2. System Configuration

This category includes all of the equipment-based cost elements needed to install an ALMRS configuration at each of 136 BLM sites. The management terminals/output devices and alphanumeric hardcopy device required at Headquarters are also included as are alphanumeric terminals and hardcopy devices supplied by BLM to the 31 selected external Federal sites.

FEDSIM used the site specific workload figures for FY 1997 as documented in Appendix B as the starting point for defining configuration requirements. FEDSIM and the ALMRS Project Office then estimated the average times for completion of each type of transaction. The estimates derived are:

- Alphanumeric case processing - 10 minutes per transaction
- Graphics case processing - 15 minutes per transaction
- Alphanumeric query - 5 minutes per transaction
- Graphics query - 15 minutes per transaction

The average transaction completion times are FEDSIM's and the ALMRS Project Office's best estimates and are based on a review of the activities that a user is expected to perform in an interactive data processing environment. ALMRS transactions generally involve retrieval of information to answer a specific question or set of questions. In typical interactive data processing environments, users perform multiple iterations of the following steps to answer a question:

- Think/formulate question in required format
- Enter question
- Wait for computer system retrieval/response
- Review/edit response

Successive iterations of this sequence bring a user closer and closer to the specific data needed. Each iteration broadens, narrows, or modifies the previous question in some way. For example, an ALMRS alphanumeric query may ask the question "What parcels of land are owned by Company X?". The response could be voluminous leading to refinement of the question to "What parcels of land are owned by Company X and used for Purpose Y?". FEDSIM estimates that an average of two iterations will be required to complete an ALMRS transaction.

Table V-5 shows the time estimates for each step of the process for the different types of ALMRS transactions. The completion time for an alphanumeric case processing transaction is longer than for an alphanumeric query, because there is significantly more input for a case processing transaction (650 characters average versus 100 characters average for an alphanumeric query). The longer time associated with graphics transactions reflects the additional complexity and capability associated with this type of activity. Based on workload estimates, an average graphic transaction will result in a land net map and three thematic overlays (e.g., ownership, status, use). Users will have more options for refining questions and outputs when operating in the graphics mode. Features such as zoom, scaling, and annotations will be used to refine questions and responses.

FEDSIM combined the site-specific workload with the transaction completion times to develop the configurations required at each site. The following assumptions were used:

- One graphics terminal is required for every 32 graphics case or query transactions processed per day. This allows for an average of 15 minutes per transaction.

ITERATION/STEP	ALPHANUMERIC QUERY	ALPHANUMERIC CASE	GRAPHIC CASE OR QUERY
	MINUTES PER STEP BY TRANSACTION TYPE		
Iteration #1			
° Think/Formulate	1	1	4
° Input	1	6	1
° Response	0.25	0.25	0.5
° Review/Edit	1	1	2
Iteration #2			
° Think/Formulate	0.5	0.5	2
° Input	0.5	0.5	1
° Response	0.25	0.25	0.5
° Review/Edit	0.5	0.5	4
Total	5	10	15

ALMRS AVERAGE TRANSACTION COMPLETION ESTIMATES

TABLE V-5

- A single digitizer is required at each site to support the entry of a limited number of inputs which must be digitized.

- A plot is required for 25 percent of the graphic case transactions and 9 percent of the graphic query transactions. One plotter is required for every 32 plots generated per day.

- A graphic hardcopy (as opposed to a plotter output) is required for 25 percent of the graphic case transactions and 21 percent of the graphic query transactions. One graphic hardcopy device is required for every 32 graphic outputs per day which do not require sophisticated plotter capabilities.

- One alphanumeric terminal is required for any combination of 48 alphanumeric case transactions and 96 alphanumeric query transactions per day. This allows an average of ten minutes for an alphanumeric case transaction which requires input of approximately 650 characters, and five minutes for an alphanumeric query transaction which has limited input.

- One printer (alphanumeric hardcopy) is required for every 3,000 pages of alphanumeric output printed daily. An average alphanumeric case transaction generates 0.86 pages of printed output, an average alphanumeric query generates 0.78 pages of printed output and an average management report generates 2.4 pages of printed output.

- One management terminal is required for each state, district, and area office manager. Three management terminals are required at the DSC and 25 are required at the Washington Office.

- The graphic query requirements of the Washington Office will be processed using graphics terminals at the DSC. The alphanumeric query requirements of the Washington Office will be met by using local management terminals to access the DSC.

- An additional five graphics and five alphanumeric terminals will be used by software maintenance personnel at the DSC.

- The disk storage requirements of each site are the sum of alphanumeric and graphic storage volumes. The disk storage needed for system and temporary use is included in the basic processor configurations.

- The type of processor required at each site is a function of the number of input devices supported and the disk capacity supported. A "Type C" CPU is used at sites with between 1 and 12 devices and less than 2 Giga Bytes

OFFICES	TRANSACTIONS					STORAGE (GBYTE)													
	A/N CASE	GRAPHIC CASE	A/N QUERY	GRAPHIC QUERY	MGT REPORT	A/N	GRAPHIC	TYPE A CPU	TYPE B CPU	TYPE C CPU	DISK GB	GRAPHICS TERMINAL	DIGITIZER	PLOTTER	GRAPHIC HARDCOPY	A/N TERMINAL	A/N HARDCOPY	MGT TERMINALS
HEADQUARTERS			103	50	1,300			0	0	0	0.000	0	0	0	0	0	1	15
DENVER SERVICE CENTER			313	107	190	33.330		1	0	0	33.330	10	1	1	1	3	1	3
ARIZONA SUBTOTAL	833	69	6,110	3,361	101	7.993	33.441	1	4	3	43.031	87	8	13	31	44	8	13
Arizona State Office	303	30	1,413	1,114	44	3.100	11.111	1	0	0	13.319	40	1	0	9	33	1	1
Arizona Strip DO	94	1	110	40	3	0.964	0.093	0	0	1	1.341	1	1	1	1	3	1	4
*Vermillion RA	33	3	147	193	13	0.317	1.135	0	1	0	1.074	5	1	3	1	4	1	3
*Phoenix DO	341	10	1,344	901	31	1.675	0.073	0	1	0	9.349	30	1	2	3	10	1	3
Kingman RA	88	7	443	391	13	0.390	1.495	0	1	0	3.409	8	1	4	3	3	1	1
*Safford DO	80	3	401	301	10	0.393	1.402	0	1	0	3.424	7	1	1	3	4	4	3
*Yuma DO	33	3	148	80	7	0.490	0.341	0	0	1	1.199	3	1	1	1	3	1	3
Havasu RA	16	1	80	10	4	0.303	0.165	0	0	1	0.931	3	1	1	1	3	1	1
CALIFORNIA SUBTOTAL	1,311	101	6,074	3,394	347	16.395	43.040	1	9	9	63.013	130	13	19	36	70	13	30
California State Office	393	33	1,336	1,433	30	3.315	13.397	1	0	0	10.893	46	1	5	14	30	1	1
Bakersfield DO	83	3	415	313	99	1.313	3.333	0	1	0	4.490	7	1	1	3	7	1	4
Bishop RA	49	4	343	189	11	0.490	0.430	0	0	1	1.030	0	1	1	1	0	4	3
Caliente RA	61	5	904	139	13	0.881	1.790	0	1	0	3.331	5	1	1	3	5	1	1
Folsom RA	61	5	304	133	13	0.894	1.001	0	4	0	3.903	5	1	1	3	3	1	1
Hollister RA	39	3	103	91	0	0.349	4.944	0	1	0	1.093	3	1	1	1	3	1	1
Susanville DO	49	4	343	131	11	0.313	1.319	0	0	1	1.993	4	1	1	1	0	1	1
Eagle Lake RA	11	1	61	30	3	0.430	0.333	0	0	1	1.191	1	1	1	1	1	4	1
Cedarville RA	19	1	61	70	3	0.903	0.307	0	0	1	0.910	1	1	1	1	1	1	1
Alturas RA	11	1	61	30	3	0.413	0.199	0	0	1	0.901	4	1	1	9	1	1	1
*Ukiah DO	144	13	799	394	33	1.030	3.379	0	1	0	4.413	13	1	2	3	11	1	3
Arcata RA	36	4	109	91	0	0.473	0.045	0	0	1	9.534	3	1	1	1	3	1	1
Redding RA	89	3	495	963	19	0.393	1.510	0	1	0	3.393	7	1	1	3	7	1	1
California Desert DO	109	9	347	993	34	1.313	3.373	0	1	0	4.490	1	1	1	3	0	1	1
El Centro RA	43	3	304	133	13	0.493	0.330	0	3	0	1.193	3	1	1	3	3	1	4
Barstow RA	39	3	191	91	0	0.043	3.190	0	1	0	3.013	3	1	1	1	3	1	1
Indio RA	94	2	191	91	3	0.493	0.330	0	0	1	1.123	3	1	1	1	2	1	1
Needles RA	94	1	171	41	3	0.711	1.073	0	0	1	1.704	3	1	1	1	3	3	4
Ridgecrest RA	49	4	343	131	11	0.711	1.073	0	0	1	1.909	4	1	1	1	0	9	3

DETAILED CONFIGURATION REQUIREMENTS

TABLE V-6

OFFICES	(TRANSACTIONS) A/M CASE	GRAPHIC CASE	A/M QUERY	GRAPHIC QUERY	MGT REPORT	(STORAGE (GBYTES)) A/M	GRAPHIC	TYPE A CPU	TYPE B CPU	TYPE C CPU	DISK GB	GRAPHICS TERMINAL	DIGITIZER	PLOTTER	GRAPHIC HARDCOPY	A/M TERMINAL	A/M HARDCOPY	MGT TERMINALS
COLORADO SUBTOTAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Colorado State Office	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Canon City DO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Northeast RA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
San Luis RA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Royal Gorge RA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Craig DO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Kremmling RA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
White River RA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Little Snake RA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
*Grand Junction DO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Glenwood Springs RA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
*Montrose DO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Gunnison Basin RA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
San Juan RA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
EASTERN STATES SUBTOTAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Eastern States Office	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Jackson DO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Milwaukee DO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Rolla RA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
IDAHO SUBTOTAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Idaho State Office	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
*Boise DO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
*Burley DO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
*Coeur d'Alene DO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cottonwood RA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
*Idaho Falls DO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Pocatello RA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
*Salmon DO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
*Shoshone DO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

DETAILED CONFIGURATION REQUIREMENTS

TABLE V-6 (Continued)

OFFICES	TRANSACTIONS A/N CASE	GRAPHIC CASE	A/N QUERY	GRAPHIC QUERY	MGT REPORT	STORAGE (GBYTES) A/N	GRAPHIC	TYPE A CPU	TYPE B CPU	TYPE C CPU	DISK GB	GRAPHICS TERMINAL	DIGITIZER	PLOTTER	GRAPHIC HARDCOPY	A/N TERMINAL	A/N HARDCOPY	MGT TERMINALS
MONTANA SUBTOTAL	2,452	151	12,112	8,159	278	15.636	22.565	4	5	2	60.101	201	14	24	68	150	13	17
Montana State Office	705	40	2,301	2,459	154	2.403	20.110	1	0	0	22.603	109	1	11	12	32	2	1
*Butte DO	310	10	1,009	522	46	1.027	2.450	0	1	0	0.077	19	1	2	4	16	1	2
Dillon RA	102	9	215	162	22	0.420	0.624	0	1	0	1.302	9	1	1	2	8	1	1
Garnet RA	102	9	355	162	22	0.806	1.910	0	1	0	3.217	8	1	1	2	8	2	1
Miles City DO	302	23	1,511	636	59	6.025	5.220	1	0	0	11.135	28	1	2	5	20	1	1
*Big Dry RA	310	10	1,045	355	46	0.891	2.061	0	1	0	2.052	17	1	2	4	16	1	2
South Dakota RA	21	2	121	66	6	1.212	5.102	0	1	0	6.402	2	1	1	1	2	1	2
Billings RA	121	11	636	200	29	0.971	1.011	0	1	0	1.022	11	1	2	2	10	1	1
Dickinson DO	226	20	1,100	500	22	1.301	4.020	0	1	0	0.000	10	1	2	5	10	1	1
*Lewistown DO	309	24	1,003	751	62	0.911	3.010	1	0	0	2.353	24	1	2	2	22	1	2
Phillips RA	121	11	636	350	29	0.602	0.250	0	1	0	0.301	11	1	2	2	10	1	2
Havre RA	26	2	121	66	6	0.620	0.507	0	0	1	1.141	2	1	1	1	2	1	2
Valley RA	56	3	131	66	6	0.202	0.201	0	0	1	0.036	2	1	1	1	2	1	1
Great Falls RA	137	12	709	252	34	0.602	0.003	0	1	0	1.550	12	1	2	2	12	1	2
NEVADA SUBTOTAL	1,700	102	8,200	5,209	319	9.066	26.961	2	9	0	36.059	176	10	20	81	120	10	10
Nevada State Office	459	35	3,272	2,259	102	2.061	11.631	2	0	0	12.722	71	1	9	15	24	1	1
*Battle Mountain DO	125	9	210	252	25	0.000	2.224	0	1	0	2.104	9	1	1	2	8	1	2
Tonopah RA	85	3	412	212	15	0.925	1.224	0	1	0	2.009	7	1	1	2	9	1	2
*Carson City DO	304	17	1,030	310	40	0.765	1.750	0	1	0	2.256	17	1	2	0	15	1	3
*Elko DO	119	10	202	255	26	0.902	1.921	0	1	0	2.326	10	1	1	2	9	1	2
*Ely DO	115	10	502	299	26	0.705	1.951	0	1	0	2.536	10	1	1	2	5	1	2
Las Vegas DO	304	19	1,010	310	46	0.060	2.220	0	1	0	2.100	17	1	2	4	15	1	1
Stateline-Esmeralda RA	21	4	252	117	11	0.755	1.521	0	1	0	2.000	2	1	1	2	6	1	1
Caliente RA	204	19	1,010	210	46	0.652	1.050	0	1	0	1.745	17	1	2	0	12	1	1
*Winnemucca DO	155	12	765	265	22	0.705	1.721	0	1	0	2.296	15	1	2	2	12	1	2
NEW MEXICO SUBTOTAL	3,210	377	16,192	10,101	710	12.154	30.202	6	7	0	32.050	321	12	29	97	205	12	14
New Mexico State Office	200	74	4,209	4,222	151	2.001	13.207	2	0	0	15.645	105	1	12	19	65	2	1
Albuquerque DO	656	24	3,221	3,100	74	0.987	1.052	1	0	0	2.270	29	1	0	0	24	1	1
Rio Puerco RA	156	19	579	429	42	0.616	0.295	0	1	0	0.000	16	1	2	0	15	1	2
Farmington RA	355	22	1,902	886	70	0.616	0.205	1	0	0	1.000	25	1	5	7	27	1	1
Taos RA	65	6	276	162	14	0.055	0.600	0	1	0	1.052	6	1	1	2	2	1	1
*Las Cruces DO	152	22	1,060	902	64	0.065	1.717	1	0	0	5.252	34	1	2	6	25	1	2
Socorro RA	65	6	256	162	14	0.614	0.270	0	1	0	0.602	0	1	1	2	2	1	1
Tulsa DO	60	0	607	500	21	1.205	2.607	0	1	0	7.040	0	1	1	2	0	1	1
Oklahoma RA	120	11	631	226	50	1.260	2.670	0	1	0	7.040	11	1	2	2	10	1	1
Roswell DO	355	30	1,792	896	72	1.111	6.550	1	0	0	2.305	39	1	2	7	27	1	3
Roswell RA	100	17	075	400	45	0.052	0.650	0	1	2	1.207	16	1	2	4	10	1	1
Carlsbad RA	100	12	512	487	26	1.000	2.005	0	1	0	6.702	14	1	2	2	12	1	1

DETA CONFIGURATION REQUIREMENTS

ABLE V-6 (Continued)

OFFICES	TRANSACTIONS					STORAGE (GBYTES)												
	A/N CASE	GRAPHIC CASE	A/N QUERY	GRAPHIC QUERY	MGT REPORT	A/N	GRAPHIC	TYPE A CPU	TYPE B CPU	TYPE C CPU	DISK GB	GRAPHICS TERMINAL	DIGITIZER	PLOTTER	GRAPHIC HARDCOPY	A/N TERMINAL	A/N HARDCOPY	MGT TERMINALS
OREGON SUBTOTAL	1,118	103	6,310	8,033	317	18.308	83.811	1	18	0	88.388	381	18	13	17	18	14	40
Oregon State Office	388	83	3,818	1,831	38	3.813	13.838	1	0	0	10.318	30	1	4	10	30	3	1
*Burns DO	88	8	378	190	33	0.318	1.313	0	3	0	0.133	7	1	3	3	3	1	3
*Coos Bay DO	31	3	133	114	11	0.613	0.318	0	3	0	3.618	3	1	1	1	0	1	0
*Eugene DO	81	6	113	133	13	0.418	0.613	0	1	0	1.070	3	0	1	1	0	1	0
Lorane RA	33	3	81	18	3	0.378	0.143	0	0	1	0.718	0	1	1	3	1	1	1
*Lakeview DO	38	6	378	314	13	0.318	1.413	0	3	0	0.113	7	3	3	0	4	1	3
Klamath Falls RA	11	3	63	18	0	0.411	3.373	0	0	3	1.104	0	1	1	1	1	1	3
*Medford DO	110	31	813	343	33	0.318	6.379	0	3	0	1.390	11	1	3	3	11	1	4
*Prineville DO	83	7	663	311	33	0.313	1.413	0	1	0	1.378	0	3	1	0	7	1	0
*Roseburg DO	63	5	314	130	13	0.440	0.318	0	1	0	0.313	4	1	1	0	0	3	0
*Salem DO	34	4	377	114	13	6.639	0.838	0	3	0	1.413	7	1	3	0	4	1	0
Tillamook RA	13	1	83	38	0	0.133	6.113	0	0	1	0.303	0	1	1	3	1	3	3
*Spokane DO	89	0	611	311	18	3.140	4.349	0	1	0	7.117	0	1	1	3	7	1	3
Wenatchee RA	13	1	43	13	0	0.061	3.134	0	3	0	3.333	0	3	1	3	3	3	3
*Vale DO	39	7	611	111	18	0.914	0.194	0	3	0	1.333	0	1	1	3	0	1	3
Baker RA	13	1	43	38	3	0.411	1.073	0	0	1	1.771	0	3	1	1	3	1	1
UTAH SUBTOTAL	8,131	177	10,473	6,373	338	11.133	33.360	0	10	0	38.100	319	13	10	13	333	16	31
Utah State Office	310	33	3,343	3,318	113	3.313	0.808	3	0	0	18.313	83	1	9	18	43	3	3
*Salt Lake DO	149	13	741	373	33	0.031	0.313	0	3	0	0.163	13	1	0	0	11	1	0
Cedar City DO	83	0	413	310	10	0.813	3.313	0	3	0	0.311	0	3	1	0	7	3	1
Kanab RA	84	0	318	313	13	0.813	0.308	0	3	0	1.343	4	1	1	3	0	1	3
Escalante RA	33	0	134	33	0	0.430	0.343	0	0	1	0.718	3	0	1	3	3	1	3
Beaver River RA	40	3	318	139	14	0.411	0.843	0	1	3	1.343	4	3	3	0	0	1	0
Richfield DO	144	0	318	301	13	0.398	3.313	0	3	0	3.311	9	1	1	0	0	4	1
*Warm Springs RA	43	0	313	130	14	0.071	0.341	0	3	0	1.314	4	1	1	0	3	3	0
Henry Mountain RA	11	3	134	33	3	0.413	0.374	0	0	1	1.040	3	1	1	3	0	1	1
Sevier River RA	41	0	113	108	0	0.413	0.403	0	0	3	1.137	6	3	3	3	4	3	3
Moab DO	191	13	854	333	43	0.331	1.033	0	1	0	3.833	14	1	3	0	10	1	1
San Juan RA	113	11	811	310	33	3.833	0.493	0	3	0	1.318	11	1	1	0	10	1	3
Grand RA	130	9	313	343	33	0.440	0.113	0	3	0	1.314	0	1	1	0	0	3	3
*Price River RA	191	14	433	431	43	0.633	0.493	0	3	0	3.343	30	1	0	0	33	1	0
*Vernal DO	317	33	3,144	341	43	0.833	0.843	3	6	0	1.133	34	1	0	4	31	1	3

DETAILED CONFIGURATION REQUIREMENTS

TABLE V-4 (Continued)

OFFICES	TRANSACTIONS A/N CASE	GRAPHIC CASE	A/N QUERY	GRAPHIC QUERY	MGT REPORT	STORAGE (GBYTE) A/N	GRAPHIC	TYPE A CPU	TYPE B CPU	TYPE C CPU	DISK GB	GRAPHICS TERMINAL	DIGITIZER	PLOTTER	GRAPHIC HARDCOPY	A/N TERMINAL	A/N HARDCOPY	MGT TERMINALS
WYOMING SUBTOTAL	8,469	370	18,133	13,007	966	13.332	33.060	6	8	0	63.103	866	10	60	103	330	16	10
Wyoming State Office	1,830	87	3,873	3,336	333	3.069	11.827	3	0	0	13.116	171	8	16	36	73	2	1
Casper DO	638	53	3,101	1,551	133	1.340	7.187	1	0	0	0.730	31	1	5	11	86	3	1
Platte River RA	160	13	806	443	39	0.707	1.070	0	1	0	1.703	13	1	3	0	13	1	1
Buffalo RA	166	13	666	863	36	0.630	0.716	0	1	0	1.377	13	1	3	0	13	1	1
Newcastle RA	133	16	1,300	334	40	1.366	3.360	0	1	0	6.606	10	1	3	0	17	1	1
Rawlins DO	430	30	3,113	1,186	63	0.033	1.660	1	0	0	3.013	36	1	0	0	33	1	1
*Divide RA	333	10	1,100	334	00	0.731	1.336	0	1	0	1.763	10	1	3	0	17	6	3
Lander RA	133	11	663	333	16	0.661	0.736	0	1	0	1.197	11	1	3	3	10	1	1
Rock Springs DO	456	30	3,313	1,160	97	0.711	1.166	1	0	0	1.017	36	1	0	0	33	1	1
*Big Sandy RA	370	33	1,337	663	50	0.633	0.666	1	0	0	1.007	33	1	3	3	30	1	3
Kemmerer RA	190	13	806	463	36	0.366	0.787	0	1	0	0.006	13	1	3	0	13	1	1
Pinedale RA	90	0	663	333	17	0.600	0.350	0	1	0	0.713	0	1	1	3	7	1	1
*Worland DO	360	30	1,773	806	77	0.666	0.776	1	0	0	1.066	36	1	3	7	36	1	3
Cody RA	66	0	463	333	10	0.633	0.666	0	1	0	1.007	0	1	1	3	7	1	1
TOTAL	31,677	1,006	107,310	61,073	3963	130.330	307.336	31	80	36	337.066	3330	136	376	336	1630	163	330

DETAILED CONFIGURATION REQUIREMENTS

TABLE V-6 (Continued)

(GB) of storage. A "Type B" CPU is used at sites which have between 13 and 49 devices and those sites that have fewer devices but more than 2GB of storage. A "Type A" CPU is used at sites with 50 or more input devices. A second CPU is added when the total exceeds 128, and a third is added when the total exceeds 256.

- The DSC configuration includes two "Type A" processors because of the additional loads associated with software development/maintenance and external user support.

- No CPU is provided at Headquarters. Headquarters users will be supported by the DSC computer.

The resultant hardware required at each site is shown in Table V-6. A final adjustment to the quantities shown in Table V-6 involved the addition of the alphanumeric terminals and printers provided by BLM to 31 selected external users. Using the workload shown in Appendix B as a starting point, FEDSIM calculated that an average external user will generate 537 alphanumeric queries per day (26,831 divided by a total of 50 external users including state and local governments). Using the assumptions previously presented, six alphanumeric terminals and a printer are required at an average external user site. The resultant 186 terminals and 31 printers were added to the BLM internal/public user totals displayed in Table V-6.

FEDSIM then developed the costs detailed in Table V-3 by combining the required quantities with unit prices for representative components. All configurations and units presented are used to develop typical cost figures and do not represent FEDSIM's recommendation of specific vendor products. In virtually all cases, numerous vendors supply appropriate capabilities.

FEDSIM allocated most configuration costs to specific fiscal years based on the schedule presented in Figure V-2. The exceptions to this are graphics and alphanumeric terminals. FEDSIM allocated these costs to fiscal years by incorporating a factor which delays acquisition of a portion of these devices to provide increased quantities consistent with estimated workload growth. A discount factor was applied to the unit prices of all line items because of the large number of units being procured. In general, discounts of between 40 and 60 percent can be expected on large scale competitive procurements. For this analysis, FEDSIM assumed a 50 percent discount for line items involving over 1,000 units. FEDSIM used a 40 percent discount for other items.

The cost elements in the category for each line item are described below.

a. Processor-Type A. This type of processor is required at the DSC, state offices, and the larger district/area offices. This processor must process at least a 1.5 Millions of Instructions per second (MIPS) and support 20 GB of disk and 128 simultaneous users. FEDSIM estimated that such a processor should have the capability to support approximately 400 ports so that the actual number of users (128) can be handled without response time degradation.

Typical vendor offerings of this type include Digital Equipment corporation's (DEC) VAX-11/785, IBM 4381-1, and Data General (DG) MV/10000. FEDSIM estimated an undiscounted unit cost for each processor of $354,000 based on the following components of a VAX-11/785:

° CPU, 2MB Memory, 2 Channels	$195,000
° Additional 6MB Memory	$ 24,000
° Additional 3 Channels	$ 39,000
° System/Temporary Disk (900 MB)	$ 38,000
° High Speed Tape Drive	$ 25,000
° Modem Interfaces	$ 3,000
° Alphanumeric Terminal Interfaces	$ 12,000
° Operator Console	$ 3,000
° Software Products (Compilers, etc.)	$ 15,000

The configuration at the DSC would be slightly different with more modem interfaces but less memory, channels, and alphanumeric terminal interfaces. The resultant cost would be approximately the same. The costs shown in Table V-3 reflect 32 Type A processors at $354,000 each.

b. Processor-Type B. This type of processor is required at most district and independent area offices. This processor must provide at least 0.7 MIPS, the ability to support up to 15 GB disk, and 50 user devices (125-150 port capacity).

Typical vendor offerings of this type include the DEC VAX-11/750, IBM 4361-4, and DG MV/8000. FEDSIM estimated an undiscounted unit cost for each processor of $125,000 based on the following components of a VAX-11/750:

CPU, 2MB Memory, 2 Channels,	$ 54,000
Additional 2MB Memory	$ 9,000
Additional Channel	$ 7,000
System/Temporary Disk (450 MB)	$ 19,000
Low Speed Tape Drive	$ 11,000
Modem Interfaces	$ 3,000
Alphanumeric Terminal Interfaces	$ 4,000
Operator Console	$ 3,000
Software Products (Compilers, etc.)	$ 15,000

The costs shown in Table V-3 reflect 88 Type B processors at $125,000 each.

c. Processor-Type C. This type of processor is required at the sites with limited workload. This processor must provide at least 0.3 MIPS, the ability to support up to 2 GB disk, and 12 user devices (20-30 port capacity).

Typical vendor offerings of this type include the DEC VAX-11/730, IBM 4361-3, and DG MV/4000. FEDSIM estimated an undiscounted unit cost for each processor of $75,000 based on the following components of a VAX-11/730:

CPU, 2MB Memory, Channel	$ 21,500
System/Temporary Disk (450 MB)	$ 19,000
Low Speed Tape Drive	$ 11,000
Modem Interfaces	$ 3,000
Alphanumeric Terminal Interfaces	$ 2,500
Operator Console	$ 3,000
Software Products (Compilers, etc.)	$ 15,000

The costs shown in Table V-3 reflect 24 Type C processors at $75,000 each.

d. Disk Storage. FEDSIM used an average cost of $45,000 per GB to provide the appropriate configurations at each office. This provides controllers and storage units of a size that includes multiple units -- even for the smallest storage requirements (e.g., multiple units of approximately 500 MB each) at area offices -- rather than use of a single larger disk. Such an approach eliminates single point failure. Representative units include the DEC RA81, IBM 3370 and 3375, and DG 6214. At state offices and the DSC, larger capacity units such as the IBM 3380 could be used. The costs shown in Table V-3 include 538 GB of disk at $45,000 per GB.

e. Offline Backup. BLM requires that a complete copy of all data be maintained at the DSC. The entire alphanumeric data base will be online. However, the entire graphics data base estimated at 153 GB will be maintained off-line. Periodic updates to the off-line data base at the DSC will be provided by the state offices. Each state office has between one and three magnetic tape drives for copying its portion of the graphics data base (average of 13.9 GB per state).

FEDSIM estimates that four additional tape drives (for a total of six) will be required at the DSC for accessing backup tapes. The undiscounted cost for these units is estimated to be $100,000. Based on a per tape capacity of 140 MB, 1,100 tapes will be required to backup the data base. Twice this number are needed to allow for DSC maintenance of an active backup copy; the states have tapes needed to update the backup. At $15 per tape, the resultant cost is $33,000. FEDSIM estimated that an additional $22,000 would be expended for physical tape storage and management facilities. The resultant total shown in Table V-3 is $155,000.

f. Graphics Terminals. FEDSIM estimated costs for graphics terminals using the following as minimum requirements:

- Local microprocessor capability
- High speed channel interface
- 1024 x 1024 pixel resolution
- 19-inch screen
- 256 colors
- Features including zoom, rotate, arc, circle, eclipse, curve generation, pan, blink, highlight, reverse video

Typical terminals with these capabilities have undiscounted unit prices of approximately $35,000. Representative offerings include the HASP 9816, Graphics Information Inc. (GII) Workstation, and Megatek Whizzard 3375. FEDSIM applied the unit cost of $35,000 to a total of 2220 graphics terminals for BLM and public users.

g. Digitizer. FEDSIM estimated the undiscounted unit cost of a typical digitizer required for low volume input at $2,500. Representative offerings are the Tektronix 411x-13 and Hewlett Packard HP9111A. FEDSIM applied this unit cost to a total of 136 digitizers.

h. Plotter. FEDSIM estimated costs for plotter devices using the following as minimum requirements:

- Ability to handle mylar and paper up to 3 feet x 4 feet
- 6-8 colors
- High quality output

Typical devices with these capabilities have undiscounted unit prices of approximately $22,000. The Hewlett Packard 7585B is a representative offering. Other vendors, including CALCOMP and Nicolet, also make a range of devices which could potentially satisfy ALMRS requirements. FEDSIM applied this unit cost to a total of 279 plotters.

i. Graphics Hardcopy. A portion of the graphics hardcopy requirements can be satisfied by devices with less sophisticated features than plotters. Devices such as color ink jet printers (e.g., Printacolor Corp. TC 1040) or color dot matrix devices (e.g., IBM 3287-2C) can produce suitable graphics hardcopy at an undiscounted unit cost of approximately $5,000. FEDSIM applied this unit cost to a total of 529 graphics hardcopy devices.

j. Alphanumeric Terminal. FEDSIM estimated the undiscounted unit cost of a typical alphanumeric terminal as $2,000. Representative offerings include the DEC VT 100 and IBM 3270 series. FEDSIM applied this unit cost to a total of 1,820 alphanumeric terminals. This figure includes 1,634 terminals for BLM and public users and 186 for selected external Federal users.

k. Alphanumeric Hardcopy. FEDSIM estimated the cost for non-impact printers capable of producing 12 pages/minute at $19,000. Representative offerings include the DEC LN01-CA laser printer and Xerox 2700 printer. FEDSIM applied the unit cost of $19,000 to a total of 174 printers including 143 for BLM/public use and 31 for selected external Federal users.

l. Management Terminal Output. FEDSIM estimated the undiscounted unit price of a management terminal/output at $6,500. A typical device built around a personal computer would include a fixed disk, display, printer and software package supporting business graphics and spreadsheet analysis. The IBM PC XT used as a representative offering includes the following components:

°	CPU, 256KB Memory, 2 Diskettes, 10MB Disk	$ 3,895
°	Additional 64KB Memory	$ 100
°	Color Graphics Monitor Adapter	$ 245
°	Color Graphics Monitor	$ 680
°	Printer Adaptor	$ 75
°	Color Jet Printer	$ 745
°	Operating System	$ 65
°	Software Package (e.g., Symphony)	$ 695

FEDSIM applied this unit price to 238 management terminals/output devices.

m. Residual Value. FEDSIM calculated the residual value of the configuration at the end of the life cycle. A factor of 10 percent was applied to the total configuration purchase cost. This has the effect of reducing FY 1997 and total life cycle costs.

3. Communications

This category includes all the investment and recurring lease costs for communications. FEDSIM used AT&T rates for all services since AT&T provides the widest geographic coverage of current suppliers. Other potential suppliers are MCI and GTE. In addition, the GEONET network recently established by the Department of Interior could be used to provide the required service. This option should be analyzed in detail once the rate structure is in place. The use of direct lines (e.g. microwave, fiber optics) between specific sites (district and area offices which are located in the same city but which are not collocated) should also be considered. The cost estimates for this category are discussed below.

FEDSIM assumed a 40 percent discount on all list prices because of the volume of communications service required.

a. BLM Voice Grade Investment. A 4800 or 9600 bits per second (BPS) dedicated line will connect each location to its parent location in the organizational hierarchy. Independent area offices will have a line to their district office; district offices will have a line to their state office; and state offices will have a line to DSC. Thus, there will be 136 of these lines which will be used for the periodic transfer of data base updates in both directions (e.g., area to district as well as district to area). Investment costs for providing this capability include the purchase price for modems and installation costs for lines and conditioning. Details of the required costs are provided in Appendix F.

b. BLM Voice Grade Recurring. The lines between BLM sites will also have recurring costs for local lines, AT&T center connection, line conditioning, long line lease, and modem maintenance. Details of the required costs are provided in Appendix F.

c. Dial-Up Investment. ALMRS sites will both input and output data on a daily basis to various financial, minerals management, and related systems. To estimate costs, FEDSIM assumed that all of those systems operate at several computer facilities in the Denver area. Based on workload estimates developed by FEDSIM, approximately 900,000 characters per day will be transmitted from each ALMRS site to interfacing systems and another 900,000 characters will be received at each ALMRS site. A 2400 bps line operating at 80 percent efficiency transmits 240 characters per second. Thus, approximately one hour of input and one hour of output interface traffic would be transmitted per day at each ALMRS site.

FEDSIM reviewed the current rates of AT&T and other suppliers and determined that, based on the assumptions above, a Wide Area Telecommunications Service (WATS) is more cost effective than a direct dial-up type of service. FEDSIM estimated the cost for WATS Service using AT&T's current rate structure. Using WATS, a separate line is required for dial-up access from ALMRS to interfacing systems and for dial-up access to ALMRS from interfacing systems. FEDSIM included the expenditures for both lines in the cost estimates. The investment costs for dial-up include purchase of two modems at each site and WATS installation charges. FEDSIM estimated the typical purchase price of a modem at $800. The installation costs for both an incoming and outgoing line at each site is $397. FEDSIM applied these unit rates to 136 sites.

d. Dial-Up Recurring. WATS line recurring charges include a fixed access charge and a usage charge depending on connect time and distance. FEDSIM determined the average distance category from ALMRS sites to Denver (a WATS Rate Step 8) and combined this with the one hour per day connect time estimate to develop a usage charge. FEDSIM also included the modem maintenance costs in calculating this cost element.

e. DSC-HQ High Speed Investment. ALMRS requires the Washington Office to have the capability to receive 1,200 management reports per day at 25 management terminals. Since DSC is the only site with a complete copy of the alphanumeric data base, it is the logical site for providing these reports. Transmission volume and the number of terminals dictate the use of multiple low speed lines or a single high speed line. FEDSIM determined that the use of a single high speed line of 56 thousand bits per second (Kbps) is more cost effective. To estimate costs , FEDSIM assumed that this line would be run to a multiplexor in the Washington Office. An alternative would be to run the line to the processor in the Eastern States Office and connect Washington users to this computer. FEDSIM used AT&T Digital Data Service (DDS) operating at 56 Kbps as the basis for costing the required line. The investment costs include the purchase of two multiplexors (e.g., Racal-Milgo Omnimix T-1 costing $51,000 each) supporting 25 terminals and a printer, two $1,000 Data Service Unit/Channel Service Units (DSU/CSU), and line installation costs of approximately $1,000.

f. DSC-HQ High Speed Recurring. The major recurring cost for the DSC to Washington Office high speed line is the 1,670 mile long line between the Denver and Washington AT&T switching centers. This cost is approximately $48,000 per year. Additional recurring costs include connect charges, multiplexor maintenance, and DSU/CSU maintenance.

g. External Voice Grade Investment. As previously discussed, the Denver Service Center will support an average of 537 alphanumeric queries per day from 50 external sites. BLM will supply the communications lines to the 31 selected external Federal users in this group. Based on workload estimates, FEDSIM determined that a single line operating at 9600 bps will support each external Federal site.

The major investment costs for this service include two modems and two multiplexors for each line. A typical 9600 bps modem costs $3,000 while a multiplexor with a capacity of eight devices (e.g., Racal-Milgo Omnimux 8) costs $2,000. Additional investment costs include line installation charges. FEDSIM applied these costs to 31 sites.

h. External Voice Grade Recurring. Of the 31 selected external Federal users, five are located in Denver. FEDSIM determined that the remaining 26 are an average of 1,000 miles from Denver and are located in cities where AT&T has a voice grade switching center. These statistics were combined with AT&T rates for switching center connect, line conditioning, local lines, and long line lease to calculate the costs shown in Table V-3.

4. Operations

This category includes all cost elements needed to build and maintain an operational capability. The cost elements in this category are discussed below.

a. Data Collection - Geographic. BLM will need to collect basic geographic coordinate data to be used in ALMRS. FEDSIM and the ALMRS Project Office allocated cost estimates for the geographic coordinate data collection to fiscal year by uniformly spreading the costs for each state across the fiscal years in which collection is planned. The cost data provided by BLM does not include any field survey activity and is a consolidation of costs for equipment and personnel needed to digitize or mathematically derive the data. The estimates presented assume that data will be collected in an automated form which can be used without conversion by ALMRS software.

b. Data Collection - Other. BLM is in the process of collecting or plans to collect data in an automated form on legal land description status stipulations and law library materials. FEDSIM used estimates for data collection provided by BLM. Costs for collection scheduled prior to FY1986 were eliminated from the totals. The remaining costs were allocated to fiscal year by assuming uniform distribution of costs for each state across the fiscal years in which collection is planned.

c. Site Preparation-Type A. FEDSIM estimated that each site requiring Type A processors will require the preparation of 600 square feet of space to house processors, storage devices, plotters, and printers. This will involve the installation of appropriate air conditioning, power, flooring, etc. This also includes installation of security components such as physical access controls and storage facilities. These components will support ALMRS requirements for typical DP installation security. Additional security features such as file access control will be implemented as part of the system software. At present, no costs are included for hardware encryption devices or communications line shielding (i.e., TEMPEST control). FEDSIM assumed that all necessary encryption will be handled through software encryption procedures. Based on its experience with other agencies, FEDSIM estimated site preparation costs as $30,000 per site ($50/square foot).

d. Site Preparation-Type B. FEDSIM estimated that Type B processing facilities will require the preparation of 400 square feet at $50/square foot.

e. Site Preparation-Type C. FEDSIM estimated that Type C processing facilities will require the preparation of 300 square feet at $50/square foot.

f. Training. FEDSIM based training costs on an approach in which four users per site (including the Washington Office) receive formal training from the ALMRS developers and/or equipment vendors. Each of these individuals will then train additional users and new users on an informal basis. FEDSIM assumed that public users and external users will pay for their own training, and estimated formal training costs at $1,000 per user. This includes course tuition but does not include loss of productive time.

g. Operations Personnel. FEDSIM determined the duties of the personnel required at each computer site. These operators will perform functions similar to those of a copying machine "key operator". Duties include:

- Supplies management, including monitoring stocks, and ordering paper, ribbons, tapes, etc.

- Maintenance coordination, including performing preventive maintenance, fixing minor problems (such as paper jams), running standard diagnostics, replacing major components (e.g., terminals) that fail, notifying vendor of major problems.

- Problem resolution, including answering simple user questions, coordinating resolution of problems requiring ALMRS development team or vendor input.

- Basic system operation such as power-on, tape mount, power-off.

- Scheduling management.

- Basic data administration functions such as backup and update transmission/receipt.

- Documentation maintenance and distribution.

- Training coordination.

This individual will not need to be a programmer or hardware technician since these functions are performed by other ALMRS components.

FEDSIM estimated that a full-time operator is required at Type A sites while an individual could fulfill this role as a half-time assignment at the other sites. A yearly rate of $32,000 per full-time equivalent (FTE) was used as the unit cost. This figure supports a mix of government operators with yearly rates of less than the BLM average personnel cost of $32,000 and contractor operators with a slightly higher yearly rate. This allows for the case in which contractor support is required at specific sites where government operators cannot be obtained.

h. Space Lease/Utilities-Type A. As opposed to site preparation (which is a non-recurring cost), space lease and utility costs are recurring costs which will continue through the life cycle. FEDSIM estimated an average yearly lease cost of $15 per square foot, and utility cost of $7.50 per square foot. This equals $13,500 for a Type A site which has 600 square feet of space.

i. Space Lease/Utilities-Type B. The yearly space lease/utility costs for each Type B facility are reduced to $9,000, since only 400 square feet of space are involved.

j. Space Lease/Utilities-Type C. The yearly space lease/utility costs for each Type C facility are reduced to $6,800, since only 300 square feet of space are involved.

k. Supplies-Graphics. FEDSIM used the yearly graphics hardcopy workload estimates for FY 1997 to determine the number of pages required. The resultant FY 1997 figure is 5.3 million pages.

FEDSIM estimated the cost for graphics supplies at $.10 per page ($100,000/million pages). This assumes a mix of paper and mylar outputs in sizes ranging from 8½ by 11 inches to three by four feet. These costs will increase as locations are automated and continue to grow as a function of increasing workload. A 40 percent discount factor was included because of the supply quantities involved.

l. Supplies-Alphanumeric. FEDSIM also estimated the yearly pages of alphanumeric hardcopy by combining transaction volumes with average pages of hardcopy required per transaction. The resultant FY 1997 figure is 34.4 million pages.

FEDSIM estimated the per page cost for alphanumeric supplies (mainly 8½ by 11 inch paper) at $.01 ($10,000/million pages). Again, these costs will increase over time as locations are automated and will continue to grow as a function of increasing workload. A 40 percent discount factor was applied because of the supply quantities involved.

m. System Configuration Maintenance. FEDSIM reviewed typical vendor price lists and determined that yearly maintenance costs average approximately five percent of the undiscounted purchase price. Vendors are generally unable to offer significant maintenance discounts, since these costs are largely personnel based. However, FEDSIM assumed that, in a competitive environment, vendors would not add to their base rates a surcharge associated with supporting remote BLM office locations. Five percent is an average across a configuration such as the one planned for ALMRS. Certain components such as processors, memory, and controllers will have slightly lower percentages and others such as printers will have higher percentages.

The estimates developed by FEDSIM are preliminary in nature and should be refined as BLM maintenance requirements and concepts are further defined. Issues such as mean-time-to-repair requirements, remote diagnostic capabilities, stocking points for spares, replenishment policies for spares, and BLM involvement in maintenance all will affect maintenance costs.

n. Application Software Maintenance. Once ALMRS is implemented, BLM will have a requirement to maintain and enhance available capabilities. FEDSIM estimated that a staff of five will be required to perform this function. This equates to 60 man-months for each year after implementation. FEDSIM estimated a cost of $8,000 per man-month for accomplishing this function.

C. BENEFITS OF THE PROPOSED SYSTEM

Benefits of the proposed ALMRS system fall into two general categories. Quantifiable benefits are those which can logically be measured in dollars and which are used to calculate benefit/cost ratios. Intangible benefits are those which cannot be quantified but which are significant factors in the decision to automate. Both types of benefits are itemized and discussed in this section.

Three types of users accrue benefits from the automated ALMRS: (1) BLM, (2) other selected Federal entities, and (3) non-Federal entities. Quantified benefits are presented in three separate spreadsheets to reflect the benefit distribution among these three user groups.

Total quantifiable (undiscounted) ALMRS benefits over the 12-year system life cycle are $869.5 million: $475.4 million to BLM, $120.7 million to other selected federal users, and $273.4 million to non-federal users. These benefits include:

- Personnel cost reductions and productivity improvements.

- Cost avoidance of redundant data gathering activities for multiple BLM systems.

- Cost avoidance of present data processing system operations and maintenance and of cyclical plat restoration.

- Cost recovery from initial data subscription and annual update sales of land and mineral data in alphanumeric and graphic form to other agencies and the private sector.

- Increased cost recovery from sale of new or improved products (e.g., maps) made possible by new technology.

The methodology used to define benefits and the algorithms developed for calculating those benefits are presented in Appendix F.

1. Quantifiable Benefits - BLM

A summary of benefit values for each item and for each of the eight major categories is provided in Table V-7. Each of the component benefits measured to determine the total quantified benefit of ALMRS to BLM is listed as a line item in Table V-8. Each line item number corresponds to the number of the algorithm used to calculate the benefit value (see Appendix F). These items are grouped into eight major categories:

- Case Processing
- Case Processing Support
- Management Reporting
- Query
- ADP
- Facilities/Non-Personnel Items Not Needed
- Cost Recovery
- Data Sharing

	BENEFIT CATEGORY	BENEFIT VALUE (UNDISCOUNTED MILLIONS)
1.	Case Processing	
	a. Assist Public Prior to Application	$ .4
	b. Receive Applications	1.4
	c. Pre-Authorization Case Processing	50.9
	d. Post-Authorization Case Processing	93.8
	e. Mining Claim Recordation Processing	24.6
	f. Reduced "KGS" Backlogs and Determinations	1.5
	TOTAL	172.6
2.	Case Processing Support	
	a. Reduce Records Maintenance Cost	.4
	b. Avoid Plat and HI Restoration	21.9
	c. Noncase Records Activity	4.9
	TOTAL	27.2
3.	Management Reporting	
	a. Reduced Management Reporting Cost	7.7
	TOTAL	7.7
4.	Query	
	a. Reduced Inquiry Response Cost	83.4
	b. Assist Users	25.8
	TOTAL	109.2
5.	ADP Costs Eliminated	40.5
	TOTAL	40.5
6.	Facilities & Non-Personnel Costs Eliminated	43.2
	TOTAL	43.2
7.	Cost Recovery, Product Sales	57.7
	TOTAL	57.7
8.	Data Sharing with GIS	
	a. Initial data transfer to GIS	7.3
	b. Update data subscription to GIS	9.8
	TOTAL	17.1

ALMRS BENEFITS OVER 12-YEAR LIFE CYCLE

TABLE V-7

BENEFIT ELEMENT			AMOUNT	UNIT	86	87	88	89	90	91	92	93	94	95	96	97
BLM BENEFITS																
ASSIST PUBLIC PRIOR TO APLN	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
RECEIVE APPLICATIONS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PRE-AUTHORIZATION Case Process	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
POST-AUTHORIZATION Case Process	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MINING CLAIMS Maint Rec Receive	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
REDUCE ACE DETERMINATION COST	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
REDUCE RECORDS MAGMT: PLAT, MI	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PLAT RESTORATION: Non-Person	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Person	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
NONCASE RECORDS ACTIVITY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
REDUCED MGMT REPORTING COST	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL MANAGEMENT RPT. [illegible]																
REDUCED QUERY Cost	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ASSIST USERS: Public, BLM	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
REPLACED ADP : Non-Personnel	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Personnel	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
FACILITIES NOT NEEDED	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
COST RECOVERY PRODUCT SALES	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
INITIAL DATA TRANSFER TO GIS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UPDATE DATA SUBSCRIPTN TO GIS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

BLM BENEFIT DISTRIBUTION

TABLE V-8

BENEFICIARY AND BENEFIT ELEMENT	CLASSIFICATION		BENEFIT BY FISCAL YEAR												TOTAL	
			1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1986-1997	
A. BLM BENEFITS			$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.1 ASSIST PUBLIC PRIOR TO OPEN	LND	AN	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.2	LND	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.3	MIN	AN	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.4	MIN	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.5 RECEIVE APPLICATIONS	LND	AN	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.6	LND	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.7	MIN	AN	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.8	MIN	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.9 PRE-AUTHORIZATION Case Process	LND	AN	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.10	LND	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.11	MIN	AN	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.12	MIN	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.13 POST-AUTHORIZATION Case Process	LND	AN	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.14	LND	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.15	MIN	AN	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.16	MIN	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.17 MINING CLAIMS Maint Doc	MIN	AN	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.18 Receive	MIN	CO	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.19 REDUCE RGO DETERMINATION COST	MIN	AN	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.20	MIN	CO	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
TOTAL CASE PROCESSING (A.1-A.20)																[illegible]
A.21 REDUCE RECORDS MAINT: PLAT, MI	LND	AN	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.22	LND	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.23	MIN	AN	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.24	MIN	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.25 PLAT RESTORATION: Non-Person	LND	AN	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$0	$0	[illegible]	
A.26	LND	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$0	$0	[illegible]	
A.27	MIN	AN	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$0	$0	[illegible]	
A.28	MIN	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$0	$0	[illegible]	
A.29 Person	LND	AN	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$0	$0	[illegible]	
A.30	LND	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$0	$0	[illegible]	
A.31	MIN	AN	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$0	$0	[illegible]	
A.32	MIN	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$0	$0	[illegible]	
A.33 NONCASE RECORDS ACTIVITY	LND	AN	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.34	LND	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.35	MIN	AN	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.36	MIN	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
TOTAL CASE PROC. SUPPORT (A.21-A.36)																[illegible]
A.37 REDUCED MGMT REPORTING COST	LND	AN	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.38	MIN	AN	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
TOTAL MANAGEMENT RPT. (A.37-A.38)																$17,700,114
A.39 REDUCED QUERY Cost	LND	AN	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.40	LND	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.41	MIN	AN	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.42	MIN	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.43 QUERY USERS: Public, BLM	LND	AN	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.44	LND	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.45	MIN	AN	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.46	MIN	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
TOTAL QUERY (A.39-A.46)																[illegible]
A.47 REPLACED ADP : Non-Personnel	LND	AN	$0	$0	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.48	MIN	AN	$0	$0	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.49 Personnel	LND	AN	$0	$0	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.50	MIN	AN	$0	$0	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
TOTAL REPLACED ADP (A.47-A.50)																[illegible]
A.51 FACILITIES NOT NEEDED	LND	AN	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.52	LND	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.53	MIN	AN	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.54	MIN	CO	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
TOTAL FACILITIES NOT NEEDED (A.51-A.54)																[illegible]
A.55 COST RECOVERY PRODUCT SALES	LND	AN	$0	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.56	LND	AN	$0	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.57	LND	CO	$0	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.58	MIN	AN	$0	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.59	MIN	AN	$0	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.60	MIN	CO	$0	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
TOTAL COST RECOVERY, PRODUCT SALES (A.55-A.60)																[illegible]
A.61 INITIAL DATA TRANSFER TO GIS	LND	AN	$0	$0	$0	[illegible]	[illegible]	[illegible]	$0	$0	$0	$0	$0	$0	[illegible]	
A.62	LND	CO	$0	$0	$0	[illegible]	[illegible]	[illegible]	$0	$0	$0	$0	$0	$0	[illegible]	
A.63	MIN	AN	$0	$0	$0	[illegible]	[illegible]	[illegible]	$0	$0	$0	$0	$0	$0	[illegible]	
A.64	MIN	CO	$0	$0	$0	[illegible]	[illegible]	[illegible]	$0	$0	$0	$0	$0	$0	[illegible]	
A.65 UPDATE DATA SUBSCRIPTN TO GIS	LND	AN	$0	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.66	LND	CO	$0	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.67	MIN	AN	$0	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
A.68	MIN	CO	$0	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
TOTAL DATA SHARING W/GIS (A.61-A.68)																[illegible]

BLM BENEFIT CALCULATION

TABLE V-9

Costs for each item are distributed according to program (Land or Mineral) and data type (alphanumeric or graphics). Where appropriate, item costs are broken into personnel and non-personnel. The yearly percentage of accrual for each benefit over a twelve-year life cycle (1986-1997) is presented in Table V-8. The corresponding calculated benefit for each fiscal year (percent accrual x benefit $ amount) and the total life cycle value of the benefit are shown in Table V-9.

A brief explanation of each line item (benefit) is provided below. All benefit values are expressed as totals over the 12-year life cycle.

a. Assist Public Prior to Application. Approximately 1,050 pre-application information requests are received annually by BLM offices. Pre-application assistance is provided to walk-in's, mail, and telephone calls for information pertaining to types of land use authorization, right-of-way, oil and gas lease, etc. Using the present manual system, BLM personnel must retrieve records from numerous locations to respond to these requests and must refile each record. Most of the current information is located in the state offices. District and area offices must request information from the state office, a process which often requires several phone calls and at least a one day response time. ALMRS will make all current land and mineral records and case file information readily available to all BLM offices. This will significantly reduce the amount of staff effort required to provide pre-application assistance. In some cases, potential applicants will be able to access the required information with no assistance from BLM personnel.

b. Receive Applications. Applications filed with BLM must first be determined acceptable or unacceptable. Unacceptable applications are returned to the applicant with a letter explaining deficiencies. Alphanumeric information from acceptable applications is used to establish a case file with an assigned serial number. ALMRS will automate these functions and will eliminate time-consuming tasks such as typing serial register pages, maintaining tickler files, and manual file searches. Acreage and fees will be calculated automatically and form letters which explain rejected applications will be generated.

c. Pre-Authorization Case Processing. This stage of case processing involves a review of the applicant's qualifications, a comparison of the land description submitted with the application against land status records, a review of applicable laws and regulations, and an attachment to the pending authorization of appropriate stipulations recommended by district or area offices. This process is lengthy and tedious, involving interpretation of complex materials and a great deal of legal research. ALMRS will eliminate the extensive manual file searches necessary to complete this process and will provide indices of laws, regulations, and stipulations. Use of automated maps and plat products will make land status checks and identification of overlap areas more accurate and less time consuming. Cost savings of more than $50 million will result from automation of these tasks.

d. Post-Authorization Case Tracking. After land use is authorized, BLM must track and monitor all case activities. Examples of case activities include processing assignments and Applications for Permit to drill, inspection and enforcement of safety requirements at well sites, payment tracking and sharing of information with the Minerals Management Service (MMS), and processing of unit and communitization agreements. BLM also is responsible for administration of the Simultaneous Oil and Gas Leasing ("SIMO") Program. All of these activities involve a heavy, paper-laden workload. For example, bond information is recorded and updated on 3x5 cards, payments and case files are manually transmitted to MMS (a process requiring numerous forms), lists of lands covered by terminated or expired leases are typed and used to formulate newly defined areas for the SIMO drawings, and after the SIMO drawings are held, land descriptions are retyped onto new lease forms. Implementation of ALMRS will make the data necessary to conduct these activities readily available to all BLM personnel in the responsible state, district, and area offices and will eliminate the need for card files, tickler files, and the manual preparation and transfer of documents. The automated system also will provide a series of indices (e.g. serial number, location) to assist users in locating information. Cost savings of approximately $94 million will result from automation of these activities.

e. Mining Claim Recordation Processing. Mining claim applications are reviewed for acceptability, payments are accounted for, and case notations are continually recorded. In addition to new claims processing, BLM must process an annual assessment statement for the 1.4 million active claims already in the system. An automated Mining Claim Recordation System was installed in 1978. However, the system does not communicate with other systems using the same data (e.g., accounting), has a limited search capability because of the data base design, and produces batch output reports, some of which are outdated when field office personnel receive them. ALMRS will tie the Mining Claim Recordation System to other automated systems, thereby eliminating duplicate data entry. Data will be available on-line to field users from terminals located in all BLM and other selected agency offices. The newly structured data base will make it possible to store and search for data more efficiently and to restructure output reports to provide selected, pertinent data. Implementation of ALMRS will result in a $25 million cost savings in mining claim recordation efforts.

f. Reduced Known Geologic Structures ("KGS") Backlogs and Determinations. As of September, 1985, 895 KGS cases were identified as backlogged. Using the present manual system, KGS determination and approval requires an average of six week's time. A fifty percent reduction in this case processing time (a $1.5 million cost savings) is anticipated as a result of the ALMRS implementation. Geologists will have access to the most current data necessary to identify oil and gas leases that fall in or around the pertinent area and will have on-line graphics overlay capabilities and statistical tools which will significantly reduce the amount of time presently required to perform tasks manually.

g. Reduced Records Maintenance. Updating of Master Title, Special Use, and Supplemental Plats; Historical Indices; Serial Register Pages; and tract book records currently require hand drafting of each change or addition. Paper and microfilm copies are then distributed and filed in the appropriate public room(s). ALMRS will essentially eliminate the traditional manual update methods. Plat updates will be automated using the alphanumeric case land data and land description/coordinate data bases. Alphanumeric data will be used to produce Historical Index equivalents. Manual distribution and copying will be eliminated through telecommunication and automated output products.

h. Avoid Plat and Historical Index Restoration. Deterioration of plat source materials is a problem which must be addressed on a recurring basis. Manual refurbishing of plats is a lengthy and costly process. A large number of plats were determined to be in a degraded condition and were designated for restoration as a result of the 1984 inventory. Some of the simpler cases can be solved by using photocopying restoration techniques. However, the majority of these plats require total redrafting and research in other records to recover illegible data. Presently, restoration and information recovery is accomplished manually on a crisis, as-needed basis. ALMRS will use electronic media to store plats, thereby eliminating the need to restore or totally redraft any plats in the future. The $21.9 million cost avoided by automating plat storage includes labor and equipment purchase and operating expenditures.

i. Noncase Records Activity. Records which are not strictly related to any one case file often require research and updating. Receipt of new survey documents and other information necessitates changes to cadastral survey notes, plats, and dockets. Research time will be substantially reduced by implementing the on-line ALMRS and the manual pulling, filing, and copying of plats will be eliminated. On-line changes to the data base will make all changes available to users in a more timely manner. This increased efficiency equates to almost a $5 million savings for BLM.

j. Reduced Management Reporting Cost. Preparation of management reports and statistical information related to land and mineral casework in the Bureau is a labor intensive process which is difficult to manage. The high volume and continual transfer of case files among offices affects the completeness and credibility of any data collected. Reports and statistics are assembled into prestructured formats, making it difficult and time consuming to break out pertinent information as requested. Measurement of accomplished workloads is imprecise, making it difficult to accurately project future workloads for budget requests (Annual Work Plans) and to develop supporting statistics for policy formulation. Implementation of ALMRS will result in standardized and accurate data collection. Bimonthly progress reporting will be accomplished automatically and transmitted to the appropriate office. The automated system will be designed to provide responses to ad hoc queries and to generate a variety of report formats. External users will be able to locate information with a minimum amount of assistance from BLM personnel. All of these features of the automated system will significantly reduce the personnel time required to prepare management reports and statistical information and will increase the accuracy and reliability of the data collected. These improvements are valued at $7.7 million.

k. Reduced Inquiry Response Cost. BLM personnel respond to numerous inquiries regarding land and mineral activities from in-house BLM staff, other federal agencies, and the public. (For this discussion, this does not include inquiries from applicants or lessees about their specific cases. Those efforts are included in case processing activities). The typical query may be related specifically to a land or mineral case or generally to the status records. Currently, checking manual records often exceeds ten minutes and locating a case file exceeds twenty minutes. Records and documents are often filed in more than one place and are frequently located in the state office. District and area office staff must make numerous phone calls to piece information together and mailing delays further extend response time when copies are needed. ALMRS will allow BLM to reduce query response times because the majority of case data required will be contained in the data base and will be accessible to all relevant State, District, and Area offices. For queries which require the use of a land copy case file to review or verify documents, seals, or certifications, ALMRS will furnish the user with the physical location of the file and the status of the case. A cost savings of almost $84 million is expected to result from automation of these activities.

l. Support User Inquiries (Public, BLM, and other Federal). It is the responsibility of the Bureau to establish and maintain the Public Land Records for the United States. These records are used by members of the general public, BLM personnel, and other federal agencies. The majority of inquiries are related to land status, mineral interests, and specific case files and are handled through BLM Public Rooms. Users often must go to numerous locations to gather information related to a specific inquiry. Pertinent records frequently are located at the state office and several telephone calls per request are necessary to obtain information. ALMRS will expedite this process by providing an on-line data base which is accessible through terminals located in the state, district, and area offices. The system will allow users to conduct independent inquiries which will require little or no assistance from BLM personnel and will result in a cost savings to BLM of more than $25 million.

m. Reduced ADP Cost. ALMRS will replace the present automated case and mining claim recordation systems. Termination of these systems will eliminate the costs of operating and maintaining them at the Denver Service Center and at the state and local level. These ADP costs (over $40 million) include personnel and non-personnel expenditures.

n. Facilities and Non-Personnel Costs (other than ADP) Eliminated. BLM activities are conducted at seven types of work stations. Work station costs include expenditures for items required to perform the functions of the present system such as space, equipment, and communications. These costs are directly related to the number of personnel and the tasks they perform. Based on present facilities and non-personnel costs (FY 1984 adjusted to a FY 1985 base), BLM estimates that the implementation of ALMRS will eliminate the need for 42 percent (over $43 million) of the facilities and other non-personnel costs currently attributable to the land and mineral activities.

BENEFICIARY AND BENEFIT ELEMENT	CLASSIFICATION PROG	DATA TYPE	BENEFIT BASE $AMOUNT	UNIT	BENEFIT PERCENT BY YEAR 86 1	87 2	88 3	89 4	90 5	91 6	92 7	93 8	94 9	95 10	96 11	97 12
8. OTHER FEDERAL BENEFIT			$17,750,000													
8.1 MGT REPORTS AND STATISTICS	LND	AN	$37,400	YR	0	0	0	0	47	61	93	131	136	141	146	151
8.2	MIN	AN	$33,300	YR	0	0	0	0	47	61	93	131	136	141	146	151
8.3 REDUCED QUERY TIME: LAN, NON LAN	LND	AN	$1,023,000	YR	0	0	0	0	47	61	93	131	136	141	146	151
8.4	LND	CR	$137,590	YR	0	0	0	0	47	61	93	131	136	141	146	151
8.5	MIN	AN	$2,054,330	YR	0	0	0	0	47	61	93	131	136	141	146	151
8.6	MIN	CR	$1,012,770	YR	0	0	0	0	47	61	93	131	136	141	146	151
8.7 INITIAL DATA TRANSFER	LND	AN	$2,401,340	OT	0	0	0	10	40	40	10	0	0	0	0	0
8.8	LND	CR	$1,740,140	OT	0	0	0	10	40	40	10	0	0	0	0	0
8.9	MIN	AN	$2,329,249	OT	0	0	0	10	40	40	10	0	0	0	0	0
8.10	MIN	CR	$5,304,130	OT	0	0	0	10	40	40	10	0	0	0	0	0
8.11 UPDATE DATA SUBSCRIPTION	LND	AN	$1,220,770	OT	0	0	0	0	0	31	64	97	116	141	146	151
8.12	LND	CR	$400,000	OT	0	0	0	0	0	31	64	97	116	141	146	151
8.13	MIN	AN	$2,443,400	OT	0	0	0	0	0	31	64	97	116	141	146	151
8.14	MIN	CR	$2,652,060	OT	0	0	0	0	0	31	64	97	116	141	146	151

OTHER FEDERAL BENEFIT DISTRIBUTION

TABLE V-10

BENEFICIARY AND BENEFIT ELEMENT	CLASSIFICATION PROG	DATA TYPE	BENEFIT BY FISCAL YEAR [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	TOTAL	
O. OTHER FEDERAL BENEFIT			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
O.1 NET REPORTS AND STATISTICS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
TOTAL [illegible]																[illegible]
[illegible] REDUCED QUERY TIME: [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
TOTAL [illegible]																[illegible]
[illegible] INITIAL DATA TRANSFER	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
TOTAL [illegible]																[illegible]
[illegible] UPDATE DATA SUBSCRIPTION	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
TOTAL [illegible]																[illegible]
TOTAL OTHER FEDERAL BENEFITS																[illegible]

OTHER FEDERAL BENEFIT CALCULATION

TABLE V-11

o. Cost Recovery, Product Sales. The general user community of the present land records system purchases copies of documents and blue line prints of plats and maps from the Bureau. Annual sales average between 2 and 2.5 million dollars. This service requires manual file searches by BLM personnel, manual reproduction, and refiling of originals. Many requests made through district and area offices must be forwarded to the state office. ALMRS will provide equal access to data by all levels of offices and will eliminate the need for manual file searches and copying. In most cases, users will be able to conduct their own research and produce copies using terminals, printers, and plotters located in the Public Rooms. BLM anticipates a three-fold increase in these product sales due to this improved access capability. Revenues of close to $58 million will be generated.

p. Initial Data Transfer to GIS. Overall data collection for ALMRS will include spatial land net and ownership data required for the BLM Geographic Information System (GIS). This data can easily be made available to GIS, thereby avoiding the cost of an independent and duplicative data collection effort. Also, Legal Land Description and Status data can be integrated into map products for use in GIS. This sharing of data represents a $7.3 million, one-time savings for BLM.

q. Update Data Subscription to GIS. ALMRS will provide spatially structured legal land descriptions, land status, and geographic coordinates to users of the Bureau's GIS. At present, such service is non-existent. This sharing of data will avoid a $9.8 million duplication of effort in the continued collection of spatial data and will provide consistency of data between ALMRS and GIS.

2. Quantifiable Benefits - Other Federal

Each of the component benefits which was measured to determine the total quantified benefit of ALMRS to selected federal users is listed as a line item in Table V-10. The table lists the yearly percentage of accrual for each benefit over a twelve year life cycle (FY 1986 through FY 1997). The corresponding calculated benefit for each fiscal year (percent accrual x benefit $ amount) and the total life cycle value of the benefit are shown in Table V-11.

a. Reduced Management Reporting Cost. Increased capabilities and faster processing which result from the implementation of ALMRS will improve BLM management reporting as previously described in Section V.C.1.J. The same personnel who prepare internal management reports will prepare reports for other Federal agencies. Related cost savings are estimated to be ten percent of the BLM savings, or more than $600,000. These savings involve access to alphanumeric data only.

b. Reduced Inquiry Response Time. BLM is the repository of all federal land and mineral lease and status records. Based on a Bureau survey conducted in 1984 it has been determined that other agencies which have surface resource management responsibilities will require inquiry response support and portions of management reports and statistics from BLM. Efficiencies resulting from implementation of ALMRS will make it possible for BLM to provide full support in these areas. Agencies supported by BLM can therefore avoid an estimated $40 million in personnel costs which would be necessary if independent research was required to collect data.

c. Avoid Costs of Initial Data Collection. Other Federal agencies manage surface resources on more than 17,000 townships throughout the lower 48 states. Presently, these agencies are using Geographic Information System (GIS) technology to analyze resource data. Many data themes which are manually digitized for use in these systems (e.g., land net, ownership, use authorizations, and mineral leases) will be available in the ALMRS system. The ALMRS data will be available in a topologically structured form via magnetic media or telecommunications links to other federal agencies for use in the GIS systems. Data collection and structuring costs of almost $25 million will be avoided by this transfer of data from ALMRS to other federal information systems. This transfer also will result in standardization of data across agencies and will make it possible to easily update data bases.

d. Avoid Costs of Updates to Data. ALMRS will provide data updates to those federal agencies which subscribe to the update service. BLM has estimated that other agencies will update annually approximately 50 percent of the data they initially receive from BLM. Updates provided by ALMRS will make it possible to avoid approximately $12.3 million in expenditures for redundant efforts to update data.

3. Quantifiable Benefits - Non-Federal

Each of the component benefits which was measured to determine the total quantified benefit of ALMRS to non-federal users are described below and listed as a line item in Table V-12. The table lists the yearly percentage of accrual for each

BENEFICIARY AND BENEFIT ELEMENT		CLASSIFICATION PROG	DATA TYPE	BENEFIT BASE $AMOUNT	UNIT	BENEFIT PERCENT BY YEAR 86 1	87 2	88 3	89 4	90 5	91 6	92 7	93 8	94 9	95 10	96 11	97 12
C.	NON-FEDERAL BENEFIT			[illegible]													
C.1	REDUCED QUERY TIME	LND	AM	[illegible]	YR	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C.2		LND	CR	[illegible]	YR	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C.3		MIN	AM	[illegible]	YR	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C.4		MIN	CR	[illegible]	YR	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C.5	REDUCED TRAVEL TO RECORDS OFC	LND	AM	[illegible]	YR	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C.6		LND	CR	[illegible]	YR	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C.7		MIN	AM	[illegible]	YR	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C.8		MIN	CR	[illegible]	YR	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C.9	INITIAL DATA TRANSFER	LND	AM	[illegible]	OT	0	0	0	10	40	40	10	0	0	0	0	0
C.10		LND	CR	[illegible]	OT	0	0	0	10	40	40	10	0	0	0	0	0
C.11		MIN	AM	[illegible]	OT	0	0	0	10	40	40	10	0	0	0	0	0
C.12		MIN	CR	[illegible]	OT	0	0	0	10	40	40	10	0	0	0	0	0
C.13	UPDATE DATA SUBSCRIPTION	LND	AM	[illegible]	YR	0	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C.14		LND	CR	[illegible]	YR	0	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C.15		MIN	AM	[illegible]	YR	0	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C.16		MIN	CR	[illegible]	YR	0	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

NON-FEDERAL BENEFIT DISTRIBUTION

TABLE V-12

benefit over the twelve year life cycle (FY 1986 through FY 1997). The corresponding calculated benefit for each fiscal year (percent accrual x benefit $ amount) and the total life cycle value of the benefit are shown in Table V-13.

a. Reduced Inquiry Response Time. State and local governments, private companies, and other non-federal users submit inquiries to BLM which are similar to those posed by internal BLM and other federal users. Efficiencies resulting from implementation of ALMRS will make it possible for BLM personnel to substantially reduce the amount of time spent to respond to these inquiries. Personnel cost savings of $85 million are estimated.

b. Reduced Travel to Records Offices. Currently, eleven BLM state offices are the only source of complete land and minerals records data for their state. This often necessitates extensive travel to and from remote locations in order to gain access to pertinent data. ALMRS will provide access to complete data at all state, district, and area offices of the Bureau. Travel by system users will be reduced to local trips to the nearest ALMRS terminal location. Time savings of almost $6 million will be realized by external ALMRS users.

c. Cost Recovery, Initial Sale of Data. The ALMRS data base will contain spatial and alphanumeric data on approximately 46,000 townships. It is anticipated that GIS users in state, county, and local governments and private industry will purchase copies of the ALMRS data which is relevant to their area of interest or administration. This sale of data will eliminate the need for duplicate data collection efforts by non-federal users and will make it possible to standardize data across user groups. Initial data sales are estimated to be over $26 million. All revenues will either be credited to the U.S. Treasury or will be used to offset operation and maintenance cost of the system.

d. Cost Recovery, Sale of Data Update Subscriptions. ALMRS will provide data updates to non-federal users who acquire initial data and the update subscription service from BLM. This service will provide the most current data to subscribers. Updates are expected to affect approximately 50 percent of initial ALMRS data (annually) and will generate more than $100 million in revenues over the twelve- year system life cycle. All revenues will be credited to the U.S. Treasury.

BENEFICIARY AND BENEFIT ELEMENT	CLASSIFICATION PROG	DATA TYPE	BENEFIT BY FISCAL YEAR [illegible] 1	[illegible] 2	[illegible] 3	[illegible] 4	[illegible] 5	[illegible] 6	[illegible] 7	[illegible] 8	[illegible] 9	[illegible] 10	[illegible] 11	[illegible] 12	TOTAL [illegible]	
C. NON-FEDERAL BENEFIT			$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
C.1 REDUCED QUERY TIME	LND	AM	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
C.2	LND	CR	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
C.3	MIN	AM	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
C.4	MIN	CR	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
TOTAL (C.1-C.4)																[illegible]
C.5 REDUCED TRAVEL TO RECORDS OFC	LND	AM	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
C.6	LND	CR	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
C.7	MIN	AM	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
C.8	MIN	CR	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
TOTAL (C.5-C.8)																[illegible]
C.9 INITIAL DATA TRANSFER	LND	AM	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	$0	$0	$0	$0	$0	[illegible]	
C.10	LND	CR	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	$0	$0	$0	$0	$0	[illegible]	
C.11	MIN	AM	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	$0	$0	$0	$0	$0	[illegible]	
C.12	MIN	CR	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	$0	$0	$0	$0	$0	[illegible]	
TOTAL (C.9-C.12)																[illegible]
C.13 UPDATE DATA SUBSCRIPTION	LND	AM	$0	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
C.14	LND	CR	$0	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
C.15	MIN	AM	$0	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
C.16	MIN	CR	$0	$0	$0	$0	$0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
TOTAL (C.13-C.16)																[illegible]
TOTAL NON-FEDERAL BENEFITS																[illegible]

NON-FEDERAL BENEFIT CALCULATION

TABLE V-13

4. Intangible Benefits.

Implementation of ALMRS will have a significant positive impact on the Land and Minerals system in many areas which cannot be quantified in dollars or other measures. Consideration of these intangible benefits is an important step in evaluating ALMRS. Implementation of ALMRS will allow BLM to accomplish the following intangible benefits.

a. Maintain Accuracy and Integrity of Data. Increased quality controls associated with the proposed automated system will significantly improve the accuracy of land and minerals data. Computer error detection measures in the partially automated case recordation and mining claims systems have proven effective in achieving a level of accuracy above the level possible under the previous manual systems. ALMRS also will improve data accuracy and integrity by eliminating hard-copies of plats, many of which are in a degraded condition. All source data will be stored on electronic media and updated, as required, on a timely basis. The system also will provide the capability to produce hard-copies on an as-needed basis.

A higher level of data accuracy will help BLM to avoid costly law suits caused by arbitrary or incorrect decisions of land law and will eliminate many delays in case processing caused by the need to correct data errors. Audit trails generated automatically in the new system will also eliminate confusion by providing the mechanism to verify data.

b. Increase Capability Required to Respond to Inquiries. Continuation of the antiquated manual operation of the land status records system will make it increasingly more difficult for BLM to respond to changing and complex information requests. A projected workload growth of 3.5 percent per year, compounded annually, and the lack of a commensurate growth in personnel will further aggravate the response time problem and is expected to result in reactive rather than planned and organized responses to applications, inquiries, and other requests for records data.

Increasing demand for land status and case processing information and for responses to ad hoc Congressional inquiries which often require quick turnaround requires that the existing systems be enhanced. ALMRS will meet this requirement and provide the capabilities necessary for BLM to maintain its credibility as the repository for federal land record data.

c. Standardize Case Processing. Closely related to increased efficiency in processing cases (previously discussed as a quantifiable benefit in Section V.C.1) is the standardization of case processing activities at the state, district, and local levels. The system structure is inherently decentralized, with more than half of the workload distributed to the local level. However, many of the local offices have limited access to historical records and legal library materials. These limitations cause a bottleneck in case processing because many activities cannot be accomplished at the local level and must be forwarded to the district or state office for completion. Implementation of ALMRS will provide equal access to graphics and alphanumeric data to all offices, thereby eliminating the bottlenecks.

d. Improve Compliance Monitoring. Quicker and easier access to case data via ALMRS will improve BLM's ability to monitor lessees' compliance with terms and stipulations of contracts. Improved monitoring of areas such as erosion control and wildlife habitat protection will help to avert serious environmental problems and costly solutions to those problems.

e. Improve Management Reports. Implementation of ALMRS will make it possible to compile and manipulate data into management reports which previously were not feasible using a manual system. Data collection for the automated system also will make possible a variety of multi-agency reports. This expanded management reporting capability can be used by BLM managers to improve policy formulation activities and to provide timely management response to issues requiring resolution. For example, the capability to perform trend analysis will enable BLM managers to identify at an early stage new types of cases or changes in case activity requiring reassignment of personnel or redistribution of funds. Industry also will benefit from trend analysis because more reliable data will provide a better basis for long-range planning.

ALMRS will provide input to modeling capabilities which can be applied to the economic development of strategic federal resources to provide input to a long-range national plan for the management of those resources. For example, ALMRS data may be input to the U.S. Geological Survey Federal Mineral Land Information System system to isolate federal resources which are the subject of policy-making and legislative activities.

f. Avoid Costs of Duplicative Records Systems. ALMRS will be accessible to BLM, other selected federal entities (e.g., BIA, Forest Service), and non-federal users, including state and local governments and private industry. It is probable that in the absence of an ALMRS-like system, many of these entities would independently undertake development of some type of automated records system. Preliminary analysis by the ALMRS project team indicates that as many as five to ten duplicative efforts might be conducted at an estimated cost of $200-400 million. A substantial portion of these expenditures would relate to spatial graphics. ALMRS will provide a more efficient, integrated system for an estimated cost of $ 240.9 million (undiscounted) over 12 years. The technology used to build ALMRS can be shared with other agencies and organizations, providing the basis for further development and enhancement of integrated capabilities throughout government and private industry.

VI. ALTERNATIVE SYSTEMS

Regulations published by the General Services Administration (GSA) and resulting orders implemented by the DOI require that a range of alternatives be evaluated prior to selecting a proposed system. Relevant direction is provided in GSA's Federal Information Resources Management Regulation (FIRMR), Parts 201-30 through 201-33. The DOI Departmental Manual Part 306 Chapter 4 (306 DM 4) provides direction regarding ADP procurement.

These documents present a range of issues to be examined. FIRMR Part 201-30.008 requires an analysis of methods of acquisition. The "Lease/Purchase Cost Comparison" documented in Appendix C addresses this issue. As a result of the analysis, FEDSIM recommends that BLM purchase all ALMRS ADP equipment which must be acquired.

Throughout both documents, the need to examine configuration alternatives is implied. Appendix D documents a comparative analysis of numerous configuration alternatives as options. As a result of this analysis, FEDSIM recommends that ALMRS be implemented as a distributed system with processors and storage located at area, district, and state offices, and the DSC.

The third class of alternatives requiring analysis under current regulations involve sources for obtaining the required ADP equipment. Potential sources identified for evaluation include:

- Use of non-ADP resources (i.e. use of an existing system which is largely manual)
- Use of existing ADP facilities and resources on a shared basis
- Use of commercial ADP services
- Use of excess equipment
- Acquisition of required hardware

As detailed in Section V, the preferred approach for ALMRS involves acquisition of required equipment. This section describes FEDSIM's analysis of other source alternatives and alternative software development strategies.

For each alternative analyzed, this section describes the alternative and discusses the suitability of the alternative for ALMRS. A life cycle cost estimate is presented for suitable alternatives. FEDSIM determined the suitability of each alternative for ALMRS based on the following factors:

- ALMRS is a large scale system in terms of hardware requirements. Thousands of terminals and hardcopy devices, hundreds of gigabytes of disk storage, and multiple processors are required in any architectural configuration employed.

- The configuration analysis detailed in Appendix D shows that distribution of processors, storage and user access devices to independent area offices, district offices, state offices, and the Denver Service Center (DSC) is the most cost effective approach. Over $40 million in additional expenditures are required to provide the same level of service using less distributed architectures.

- As opposed to many other systems, the costs for ALMRS processors and disk storage will not be the dominant component of hardware expenditures. The large number of ALMRS users, and the fact that spatial graphics processing is the backbone of the system result in the requirement for significant expenditures for graphics terminals, plotters, and graphics hardcopy devices.

- The ALMRS acquisition should be based on a competitive procurement to take advantage of the 40 to 50 percent price reductions typically offered by vendors in a large scale competitive environment. Any approach which could reduce competition (e.g., use of existing processors that limit the range of compatible graphics terminals) must be avoided.

- ALMRS requirements involve a relatively constant workload over a long period of time. While there are peak periods of processing for land and minerals management, there is generally a steady day-to-day workload. Any ALMRS equipment that is installed must be supported for eight to ten years.

As discussed below, any source alternative other than competitive acquisition falls short in most or all of these areas.

The general source options requiring analysis were translated into BLM/ALMRS specific alternatives. The alternative approaches analyzed by FEDSIM are listed below:

- Continued use of the current land and minerals records system.

- Use of excess ADP equipment from the GSA Availability List.

- Use of commercial timesharing.

- Shared use of existing Honeywell based equipment at the DSC and state offices.
- Shared use of planned equipment being obtained under the Fish and Wildlife Service/Bureau of Land Management (FWS/BLM) procurement for GIS hardware.
- Acquisition or traditional software development using an existing package such as the GIS MOSS as a starting point.

A. CONTINUED USE OF THE EXISTING SYSTEM

As detailed in Section III, the existing system is largely manual and suffers from problems that will become even more significant as workload increases. Continued use of the existing system is not a suitable alternative for meeting BLM's needs for efficient land and minerals record management.

B. USE OF EXCESS ADP EQUIPMENT

This subsection presents the alternative of using excess ADP equipment.

1. Description

Part 201-33 of the FIRMR entitled "Reuse of ADP Equipment" sets forth policies and procedures governing the reutilization of ADP equipment in the Federal Government. GSA publishes and distributes an Availability List to inform Federal agencies of available excess ADP equipment. Interested agencies may then request the transfer of excess ADP equipment to their organization. The cost to the receiving agency depends on several specific conditions but is generally much less than the original equipment acquisition price.

2. Suitability

This alternative is not suitable for meeting ALMRS requirements. The items appearing on the Availability List are generally single storage units or peripherals rather than complete hardware systems. The general intent of the reutilization program is to provide equipment to enhance or upgrade an existing configuration. This approach cannot be used to provide the range and quantity of ADP equipment required by ALMRS.

C. USE OF COMMERCIAL TIMESHARING

This subsection presents the alternative of using commercial timesharing.

1. Description

GSA's Teleprocessing Service Program (TSP) is a centrally managed program (authorized under Part 201-32.303 of the FIRMR) by which Federal agencies acquire commercial remote computing services which cannot be satisfied by existing Government resources. Services offered within the scope of the TSP include interactive, remote batch, and specialized data processing. The program also provides for the acquisition of training, specialized data bases, and technical support incidental to the services being acquired. There are numerous commercial vendors which provide services under the TSP.

2. Suitability

This alternative is not suitable for meeting ALMRS requirements. Commercial timesharing can only provide processing and disk storage capabilities and user access devices would still have to be acquired separately. Commercial timesharing is a centralized service which does not match the distributed architecture determined to be more effective for ALMRS. As detailed in Appendix D, a minimum of nearly $60 million in additional costs would result because of the need for communication lines to operate ALMRS in a centralized mode over an eight year period of operations.

Furthermore, the availability of continued support for ALMRS over an eight year period cannot be guaranteed by a TSP vendor since TSP agreements are generally only for a three year period. Finally, since TSP is intended for use by applications which cannot be committed to a specified level of recurring usage, unit rates are higher than those associated with a dedicated equipment approach. For example, a representative TSP vendor (Boeing) charges approximately $7,000 per month for one GB of online disk storage. This equates to $672,000 over an eight year operational life. In contrast, purchase and maintenance of one GB of disk over an eight year period can be expected to cost approximately $45,000.

D. USE OF EXISTING BLM EQUIPMENT

This subsection presents the alternative involving shared use of existing Honeywell based equipment at the DSC and state offices as described in section III. The general findings also apply to the use of other central computers such as the US Geological Survey Amdahl on a shared basis.

1. Description

Existing BLM hardware consists of a Honeywell DPS 8/70 mainframe located at the DSC and Honeywell minicomputers at the state offices. Area and district offices use WATS lines to access these processors. These processors are used to support a range of existing applications, and FEDSIM estimates that approximately 50 percent of the existing resources can be made available to ALMRS.

2. Suitability

This alternative is not suitable for meeting ALMRS requirements. The available resources of the existing configurations do not provide nearly enough capacity to meet ALMRS needs. For example, the current state office configurations have 0.512 GB of disk storage. The amount available to ALMRS is 0.256 GB (50 percent). This falls far short of the ALMRS average requirement for 14 GB at a state office.

The current configuration involves processor/storage distribution only to the state level rather than to the area office level. As detailed in Appendix D, at least $9 million in additional life cycle costs would be required to provide access to graphics devices at area and district offices in a configuration distributed to the state level.

The option of expanding existing resources to accommodate ALMRS requirements would also not be cost effective. The existing base represents such a small percentage of the capacity needed for ALMRS that a fifty-fold increase in resources would be required. To expand in a fashion that does not impact existing applications, a sole source acquisition with Honeywell is required. Such an approach limits BLM's ability to obtain discounts and also reduces the competition for providing user access devices since Honeywell compatibility would be required.

E. USE OF PLANNED BLM EQUIPMENT

This subsection presents the alternative involving shared use of the planned equipment being obtained under the Fish and Wildlife Service (FWS) and BLM procurement for GIS hardware.

1. Description

The DOI has issued an RFP for a GIS computer procurement. The procurement encompasses the hardware, software, maintenance, documentation and training for a minicomputer-based geographic data processing system. The hardware acquisition includes processors, disk storage, alphanumeric terminals and printers.

Graphics terminals and plotters are not included. The software acquisition includes operating system, data base management, graphics device support, languages processing, and utility capabilities. The acquisition includes conversion of the GIS MOSS software from the Data General to the proposed hardware.

The RFP includes a firm commitment for three configurations to be used by FWS. An optional quantity of 51 configurations for the FWS is also included. All 248 configurations included for BLM are optional quantities. The RFP has been released to industry and award of the contract is planned for mid FY1986.

2. Suitability

The potential advantage of this approach is that it provides a single ADP capability to support resource management and land and minerals records processing. This will facilitate interface between these two key BLM functional areas. The planned acquisition is also intended to provide a distributed architecture consistent with the recommended ALMRS structure.

However, while this approach is more viable than previously discussed alternatives, the RFP as written does not satisfy ALMRS requirements. The problem is that ALMRS workload was not included in sizing the configurations specified in the RFP. Thus, the stated quantities of optional units in the RFP would need revision to meet ALMRS requirements. This would require DOI/IRM approval and an amendment to the current RFP. It is likely that the total dollar ceiling will be affected requiring additional delegation of procurement authority. The following paragraphs describe areas in which ALMRS requirements exceed the requirements specified in the RFP.

The RFP specifies four generic configurations. For each configuration, a basic system is specified, and an optional quantity to be acquired is identified. Each configuration is required to provide expansion capabilities up to a specified minimum level. This expansion covers memory, disk, ports, tape storage, printers, and alphanumeric terminals. An optional quantity of expansion components to be acquired is identified. Table VI-1 summarizes the RFP specified quantities (with allocations to specific sites slightly modified) in comparison to the ALMRS requirements.

As shown in Table VI-1, several problems exist. The Type D configurations in the RFP do not provide the disk capacity or local ports required for ALMRS processing at independent area offices. At the DSC, state offices, and district offices, the specified configurations have the capacity for supporting enough disk capacity for ALMRS processing. However, the maximum optional quantity of storage units currently specified in the RFP is not sufficient for reaching this capacity. In addition, the maximum number of local ports specified for the state office

	Requirements At Average Site				GIS Procurement Quantities		
ALMRS Sites (Number)	Disk Storage (GB)	Local Ports	System Type (Optional Quantity)	Basic Disk (GB)	*Basic + Additional Optional Quant. (GB)	Maximum Disk Capacity (GB)	Maximum Local Ports
Denver Service Center (1)	20.6	16	A(1)/C(1)	.38	11.7	23	192
State Offices (11)	16.2	140	A(12)	.35	9.2	18	128
Districts/ Collocated Areas (59)	3.8	44	A(1)	.35	2.2	18	128
			B(31)	.27	2.2	8	128
			C(27)	.03	2.2	5	64
Independent Areas (65)	1.8	16	D(175)	.0003	–	.07	8

* Calculated by allocating 90% of total to BLM and spreading result to DSC, states and districts based on disk storage requirements ratios.

ALMRS REQUIREMENTS VERSUS GIS PROCUREMENT QUANTITIES

TABLE VI-1

configurations is not enough to support all ALMRS devices. All these problems would exist, even if all resources were available for ALMRS processing. Any use of these resources by GIS further extends the shortfall of capabilities versus ALMRS requirements.

An additional problem is that the local ports have a maximum transfer rate of 19.2 Kbps. This equates to 1.8 thousand characters per second (assuming 75 percent efficiency). This means that the delay for transferring 72,000 characters of graphics data would be 40 seconds. This communications delay is in addition to normal response time and is not suitable for an interactive environment. A configuration designed specifically for ALMRS would provide for connection of ALMRS graphics devices to the processor via a high speed connection (e.g., a computer channel, bus, or a local area network). The GIS RFP does not require channel or bus connection or a local area network (LAN).

A final consideration is that the GIS procurement does not include graphics terminals. This means that a separate ALMRS acquisition would be needed for these devices. Since the devices would be required to interface with the specific computer selected in the GIS procurement, the competition between graphics terminals suppliers would be limited. This means that the discount for these devices, which represent a significant ALMRS cost component, is likely to be less than in a totally open acquisition.

F. ACQUISITION/TRADITIONAL SOFTWARE DEVELOPMENT

This subsection presents the alternative in which ALMRS is implemented using hardware procured through an ALMRS competitive acquisition and software is developed using an existing graphics capability based on a prestructured topological approach as a starting point. The FWS and BLM procurement for GIS hardware is not used in this approach. The ALMRS competitive acquisition included in this alternative does not include capacity required to support GIS processing.

1. Description

In this alternative (as in the preferred approach detailed in Section V), the hardware required to support ALMRS processing is obtained via a competitive procurement. The software development approach is different from the preferred approach described below.

GIS MOSS is a non-proprietary software system designed to perform various analysis and display functions needed to perform resource management activities. MOSS is representative of a traditional system which uses polygon representations and prestructured topological data bases. This system was originally developed and implemented by the Fish and Wildlife Service's Western Energy and Land Use Team (WELUT) in Ft. Collins, Colorado, and is now being used widely on several different computer systems by numerous state, federal, and private organizations, including several DOI bureaus. The initial MOSS had substantial modifications and improvements to facilitate data capture, faster data analysis, and production of output products. In this alternative, MOSS or a similar package would form the basis for developing ALMRS specific applications.

2. Suitability

Since this alternative uses the preferred approach for hardware acquisition, it has the potential for satisfying ALMRS requirements. Thus, this alternative was subjected to a life cycle cost analysis as detailed in the next subsection.

The results of this analysis indicates that this alternative is not as cost effective as the preferred approach. The concept used in packages such as MOSS involves storing spatial data in a prestructured topological fashion. In this structure, points, lines, and polygons are stored in a manner which embeds the spatial relationships. This provides a structure which minimizes the computations required on the retrieved data but increases the computations required for updates. From a cost standpoint, this structure significantly increases disk storage requirements and results in life cycle costs higher than those in the proposed system.

In addition to having higher life cycle costs than the proposed system, the use of a package such as MOSS as the basis for ALMRS development has several other drawbacks. These stem from differences in the land resource management functions which MOSS automates and the land and mineral records functions which ALMRS automates. Resource boundaries generally involve field or office determinations of resource location estimates where boundaries may not be exact over large geographic areas. Land and mineral records functions focus on issues involving legal ownership and status of specifically surveyed land.

A major difference in the two functions involves the update of attribute data. As previously discussed, packages such as MOSS store spatial data in prestructured topological fashion. The difficulty in updating this structure results from the fact that changing a single element requires that all structures (including the changed element) be modified to reflect changes in the predefined spatial relationships. This would have a small effect on resource management data collection, since resource data is static in nature. However, the ownership and status data associated with land and minerals records is subject to continuous change. Thus, the planned ALMRS approach of not defining spatial relationships of elements in a prestructured mode is more effective for handling data collection which has a significant amount of updates.

A second issue concerns precision. Resource data covers large areas, and precise definition of boundaries for specific resources is not appropriate. For example, it is virtually impossible to define exactly the boundaries of petroleum or mineral deposits. Thus, simple structures are often used in resource management data processing systems without regard to slight inaccuracies such as slivering (slight overlap of polygon boundaries). The need to store and process polygons of small areas is generally not critical in resource management applications. Conversely, land and minerals records processing requires accurate portrayals of legal boundaries to the precision of the data supplied and requires detailing characteristics of segments which are as small as 0.625 acres.

This alternative has cost and technical limitation when compared to the preferred approach. Even in the preferred approach there remains a need to provide the capability to pass land and minerals records data to resource management processes. These interfaces can be achieved by developing modules to convert ALMRS data into the format required for resource management processing. DSC plans to implement these modules within ALMRS.

3. Cost

The cost factors used to develop life cycle estimates for this alternative are itemized in Table VI-2. This table summarizes differences between these factors and those used to develop estimates for the proposed system. The resultant life cycle costs for this alternative are detailed in Table VI-3, which shows that the life cycle costs associated with this alternative are more than $20 million higher than those estimated for the proposed system.

a. System Development. Development costs for this alternative are $6 million less than those for the proposed system. FEDSIM estimated that system definition, design, and development and test levels of effort would be reduced by 50 percent while acquisition management activity would be reduced by 25 percent. The reduction in effort from the proposed system is a result of:

- The ability of ALMRS to use portions of an existing package as a basis for application development
- Reduction in the scope of ALMRS prototype efforts
- Elimination of R&D efforts as part of the development process

b. System Configuration. In this alternative, system configuration costs are over $11 million higher than those in the proposed system. The major reason for this increase

COST ELEMENT	QUANTITY	UNIT $	DISCOUNT	COSTS FISCAL YEAR 1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	DIFFERENCE FROM PROPOSED SYSTEM
1. SYSTEM DEVELOPMENT																
1.a INITIATION PHASE COMPLETION	13 M/M	80,000		100%												
1.b SYSTEM DEFINITION	73 M/M	80,000		100%												DECREASED QUANTITY (LEVEL OF EFFORT)
1.c ACQUISITION MANAGEMENT	80 M/M	10,000		45%	55%											DECREASED QUANTITY (LEVEL OF EFFORT)
1.d SYSTEM DESIGN	370 M/M	80,000			100%											DECREASED QUANTITY (LEVEL OF EFFORT)
1.e SYSTEM DEVELOPMENT/TEST	1320 M/M	17,000				40%	60%									DECREASED QUANTITY (LEVEL OF EFFORT)
2. SYSTEM CONFIGURATION			00%													
2.a PROCESSOR-TYPE A	32 CPU	$301,000	08%			1%	17%	60%	22%							INCREASED UNIT COST
2.b PROCESSOR-TYPE B	113 CPU	$143,000	40%			1%	17%	60%	21%							INCREASED QUANTITY AND UNIT COST
2.c PROCESSOR-TYPE C	8 CPU	173,000	08%			1%	17%	60%	22%							DECREASED QUANTITY
2.d DISK STORAGE	1310 GBYTE	143,000	08%			2%	17%	60%	12%							INCREASED QUANTITY
2.e OFFLINE BACKUP	1 SYS	$340,000	01%					100%								INCREASED UNIT COST
2.f GRAPHICS TERMINAL	1320 UNIT	120,000	50%			1%	13%	07%	30%	4%	3%	3%	3%	3%	3%	DECREASED UNIT COST
2.g DIGITIZER	130 UNIT	$2,300	08%			1%	17%	60%	31%							
2.h PLOTTER	370 UNIT	113,000	40%			1%	17%	80%	21%							
2.i GRAPHICS HARDCOPY	330 UNIT	15,000	40%			1%	17%	60%	33%							
2.j ALPHANUMERIC TERMINAL	2010 UNIT	22,000	30%			1%	12%	47%	28%	4%	3%	3%	3%	3%	3%	
2.k ALPHANUMERIC HARDCOPY	170 UNIT	110,000	10%			2%	17%	60%	21%							
2.l MANAGEMENT TERMINAL/OUTPUT	330 UNIT	$4,500	08%			1%	17%	60%	22%							
2.m RESIDUAL VALUE																
3. COMMUNICATIONS																
3.a BLM VOICE GRADE INVEST	1 NET	$845,500	08%			2%	17%	80%	21%							
3.b BLM VOICE GRADE RECUR	1 NET	$824,300	40%			1%	10%	71%	100%	100%	100%	100%	100%	100%	100%	
3.c DIAL UP INVEST	1 NET	$371,400	03%			1%	17%	80%	21%							
3.d DIAL UP RECUR	1 NET	$3,327,000	08%			1%	10%	70%	100%	100%	100%	100%	100%	100%	100%	
3.e DSC-HQ HIGH SPEED INVEST	1 LINE	$183,000	08%						100%							
3.f DSC-HQ HIGH SPEED RECUR	1 LINE	140,000	40%						100%	100%	100%	100%	100%	100%	100%	
3.g EET VOICE GRADE INVEST	1 NET	$320,000	40%			1%	17%	60%	31%							
3.h EST VOICE GRADE RECUR	1 NET	$303,400	08%			1%	10%	70%	100%	100%	100%	100%	100%	100%	100%	
4. OPERATIONS																
4.a DATA COLLECTION-GEOGRAPHIC	1 PROJ	$10,000,000			30%	24%	31%	21%	0%							
4.b DATA COLLECTION-OTHER	1 PROJ	$33,000,000		10%	17%	31%	16%	10%	2%							
4.c SITE PREPARATION-TYPE A	24 SITE	100,000				1%	17%	60%	21%							INCREASED UNIT COST
4.d SITE PREPARATION-TYPE B	312 SITE	$30,000				2%	17%	60%	31%							INCREASED QUANTITY AND UNIT COST
4.e SITE PREPARATION-TYPE C	8 SITE	$13,000				1%	17%	80%	32%							DECREASED QUANTITY
4.f TRAINING	340 USER	$1,000				1%	17%	60%	23%							
4.g OPERATIONS PERSONNEL	80 FTE	133,000				1%	10%	70%	100%	100%	100%	100%	100%	100%	100%	
4.h SPACE LEASE/UTILITIES-TYPE A	28 SITE	$10,000				1%	10%	70%	100%	100%	100%	100%	100%	100%	100%	INCREASED UNIT COST
4.i SPACE LEASE/UTILITIES-TYPE B	312 SITE	$13,300				1%	10%	70%	100%	100%	100%	100%	100%	100%	100%	INCREASED QUANTITY AND UNIT COST
4.j SPACE LEASE/UTILITIES-TYPE C	8 SITE	$4,000				1%	10%	70%	100%	100%	100%	100%	100%	100%	100%	DECREASED QUANTITY
4.k SUPPLIES-GRAPHICS	5.3 MPAGE	$100,000	08%			1%	14%	41%	81%	85%	88%	81%	84%	87%	100%	
4.l SUPPLIES-ALPHANUMERIC	34.4 MPAGE	110,000	40%			1%	14%	41%	81%	83%	88%	81%	81%	97%	100%	
4.m SYSTEM CONFIGURATION MAINT	3% HW $															INCREASED QUANTITY (HARDWARE $)
4.n APPLICATION SOFTWARE MAINT	40 M/M	10,000							100%	100%	100%	100%	100%	100%	100%	

COST FACTORS - TRADITIONAL SOFTWARE DEVELOPMENT

TABLE VI-2

COST
FISCAL YEAR

COST ELEMENT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	TOTAL
1. SYSTEM DEVELOPMENT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.a INITIATION PHASE COMPLETION	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.b SYSTEM DEFINITION	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.c ACQUISITION MANAGEMENT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.d SYSTEM DESIGN	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1.e SYSTEM DEVELOPMENT/TEST	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2. SYSTEM CONFIGURATION	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2.a PROCESSOR-TYPE A	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2.b PROCESSOR-TYPE B	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2.c PROCESSOR-TYPE C	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2.d DISK STORAGE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2.e OFFLINE BACKUP	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2.f GRAPHICS TERMINAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2.g DIGITIZER	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2.h PLOTTER	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2.i GRAPHICS HARDCOPY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2.j ALPHANUMERIC TERMINAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2.k ALPHANUMERIC HARDCOPY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2.l MANAGEMENT TERMINALS/OUTPUT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2.m RESIDUAL VALUE												[illegible]	[illegible]
3. COMMUNICATIONS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3.a [illegible] VOICE GRADE INVEST	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3.b [illegible] VOICE GRADE RECUR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3.c DIAL UP INVEST	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3.d DIAL UP RECUR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3.e [illegible]-HQ HIGH SPEED INVEST	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3.f [illegible]-HQ HIGH SPEED RECUR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3.g [illegible] VOICE GRADE INVEST	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3.h [illegible] VOICE GRADE RECUR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4. OPERATIONS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.a DATA COLLECTION-GEOGRAPHIC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.b DATA COLLECTION-OTHER	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.c SITE PREPARATION-TYPE A	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.d SITE PREPARATION-TYPE B	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.e SITE PREPARATION-TYPE C	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.f TRAINING	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.g OPERATIONS PERSONNEL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.h SPACE LEASE/UTILITIES-TYPE A	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.i SPACE LEASE/UTILITIES-TYPE B	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.j SPACE LEASE/UTILITIES-TYPE C	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.k SUPPLIES-GRAPHICS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.l SUPPLIES-ALPHANUMERIC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.m SYSTEM CONFIGURATION MAINT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.n APPLICATION SOFTWARE MAINT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL CAPITAL INVESTMENT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL OTHER NON-RECURRING	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL RECURRING	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL ALL COSTS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PRESENT VALUE FACTOR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
PR[illegible]ALUE COST	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

COSTS - T[illegible]AL SOFTWARE DEVELOPMENT

[illegible]

is the need for significantly more disk storage. FEDSIM estimates that a single copy of the graphics data base increases from 153 GB to 420 GB when a prestructured topological approach is used. The net effect in the total data base size (providing copies to district offices and independent area offices) is an increase of 672 GB. The tape storage backup requirements also increase by four tape drives, 3,800 tapes, and a proportional amount for physical tape storage and management facilities.

Processor costs also increase in this alternative. All processors must be at least Type B to support the amount of disk storage required. Processor capabilities also must increase to support additional computations associated with updating a prestructured topological data base. FEDSIM added the cost of a processor accelerator and another 2 MB of memory to the Type A and Type B processor unit costs.

Increased processor costs are offset by reductions in the costs for graphics terminals in this alternative. Since these terminals will not be required to compute spatial relationships, their internal processing power can be reduced. FEDSIM included a 20 percent reduction in the unit cost of graphics terminals in this alternative.

c. Communications. In this alternative, there are no changes to the communications cost estimates associated with the proposed system.

d. Operations. Operations costs for this alternative are over $15 million higher than those for the proposed system. The major component of this difference is an increase in hardware maintenance (due to a much greater disk complement). FEDSIM estimated that the space required to house the added disks would result in a 33 percent increase in site preparation and space lease/utilities costs at Type A sites and a 50 percent increase at Type B sites.

VII. COMPARATIVE BENEFIT/COST SUMMARY

FIPS PUB 64 prescribes the use of the following three quantitative measures for evaluating each alternative:

- Net Present Value - the difference between the total present value of benefits and the total present value costs
- Benefit/Cost Ratio - the ratio of the total present value of benefits and the total present value costs
- Payback Period - the year in which the sum of the present value of benefits first exceeds the sum of the present value costs

FEDSIM calculated these measures for two alternatives: (1) the proposed system as documented in Section V and (2) the alternative involving traditional software development as documented in Section VI.F.

A. PROPOSED SYSTEM

The relevant benefit/cost measures for the proposed system are shown in Table VII-1, and the costs and benefits used to derive this table are detailed in Section V. FEDSIM calculated these measurements using benefit values under three scenarios:

- Scenario 1 - Inclusion of only those benefits attributable to BLM
- Scenario 2 - Inclusion of only those benefits attributable to BLM and other Federal agencies
- Scenario 3 - Inclusion of benefits attributable to BLM, other Federal agencies, and other users

As shown in Table VII-1, a positive net present value and a benefit/cost ratio greater than one occur in all three scenarios. These measures become more favorable in Scenarios 2 and 3, because benefits increase as the system expanded to encompass additional agencies and users while costs remain fixed across all scenarios (since the life cycle estimates developed by FEDSIM already include the capabilities needed to support BLM, other Federal agencies, and public users).

Figures VII-1 through VII-3 show the benefits and costs of the proposed system over time for each scenario. These figures show both yearly and cumulative benefits and costs. All dollars are shown in terms of present value. The intersection of the cumulative benefits and the cumulative costs represents the breakeven point which determines the payback period.

BENEFIT/COST MEASURE	SCENARIO 1 BLM ONLY	SCENARIO 2 ALL FEDERAL	SCENARIO 3 ALL USERS
Present Value Benefits ($Million)	212.5	265.0	385.8
Present Value Costs ($Million)	140.7	140.7	140.7
Net Present Value ($Million)	71.8	124.3	245.1
Benefit/Cost Ratio	1.51	1.88	2.74
Payback Period (Year)	9	8	7

BENEFIT/COST MEASURES-PROPOSED SYSTEM

TABLE VII-1

B. TRADITIONAL SOFTWARE DEVELOPMENT ALTERNATIVE

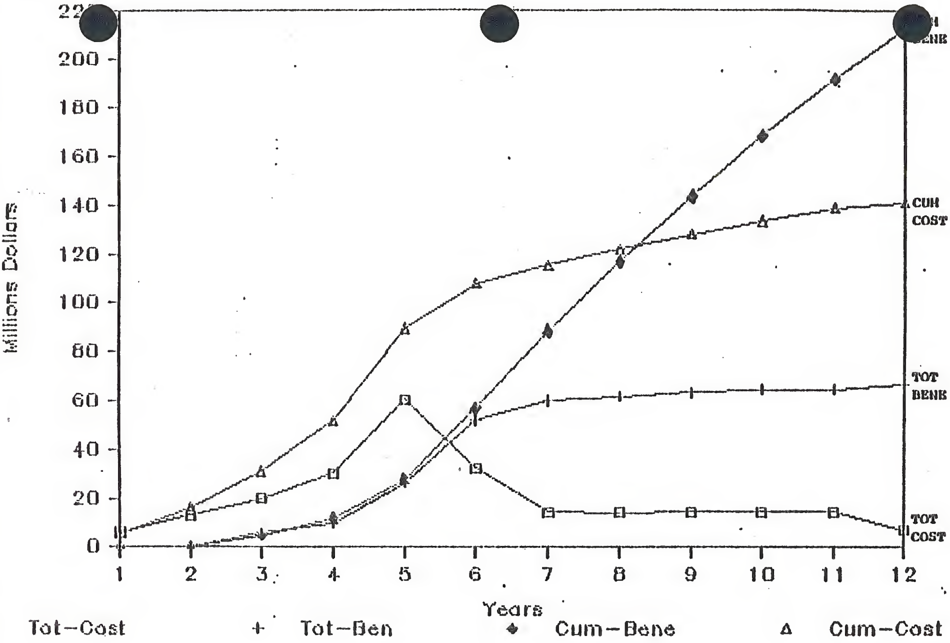
Relevant benefit/cost measures for the alternative involving traditional software development are shown in Table VII-2. The costs used to derive this table are detailed in Section VI.F. The benefits used are identical to those associated with the proposed system, since the traditional software development alternative is designed to meet all ALMRS requirements.

As shown in Table VII-2, positive net present values and benefit/cost ratios greater than one occur even with the higher costs associated with the traditional software development alternative. This means that ALMRS implementation is cost effective even if portions of the ALMRS prototype cannot be made operational and a more traditional approach must be used.

BENEFIT/COST MEASURES	SCENARIO 1 BLM ONLY	SCENARIO 2 ALL FEDERAL	SCENARIO 3 ALL USERS
Present Value Benefits ($Million)	212.5	265.0	385.8
Present Value Costs ($Million)	151.3	151.3	151.3
Net Present Value ($Million)	61.2	113.7	234.5
Cost/Benefit Ratio	1.40	1.75	2.55
Payback Period (Year)	9	8	7

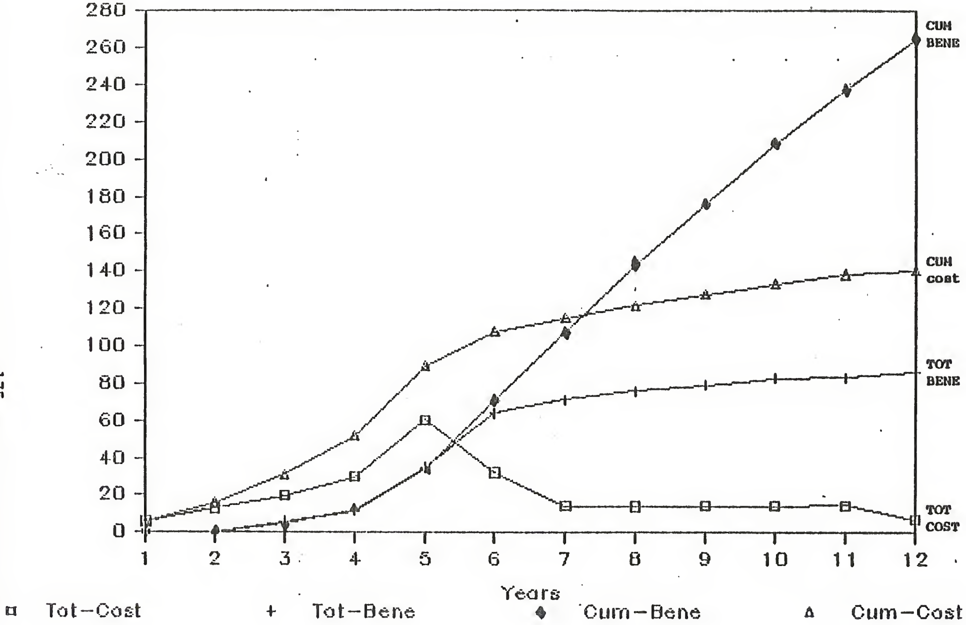
BENEFIT/COST MEASURES-TRADITIONAL SOFTWARE DEVELOPMENT ALTERNATIVE

TABLE VII-2



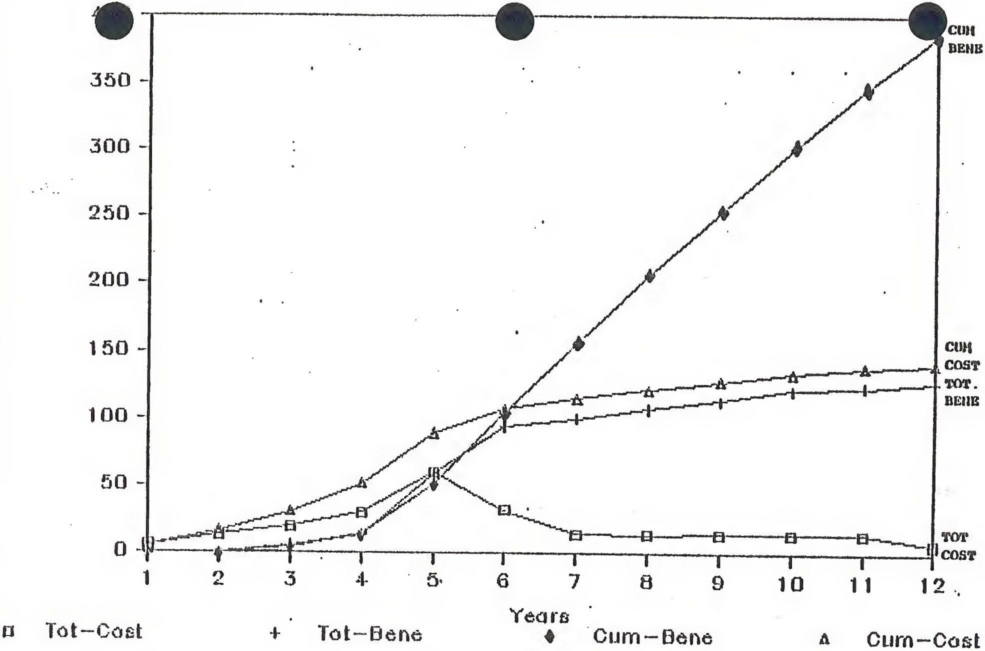
ALMRS BENEFIT/COST ANALYSIS
BLM USE

FIGURE VII-1



ALMRS BENEFIT/COST ANALYSIS
ALL FEDERAL USERS

F[illegible]E VII-2



ALMRS BENEFIT/COST ANALYSIS
ALL USERS

FIGURE VII-3

VIII. SENSITIVITY ANALYSIS

FEDSIM made three classes of assumptions in developing cost and benefits for ALMRS. Assumptions of the first class are based on detailed data and are considered to have a high degree of accuracy. Assumptions of the second class have little effect on the cost estimates because they do not involve key variables, and assumptions of the third class are based on best judgement estimates and/or have a significant effect on the resulting benefit/cost estimates. FEDSIM performed a series of sensitivity analyses on the third class of assumptions to determine the impact of varying key assumptions.

Specific sensitivity analyses were performed based on a prioritized list of factors developed jointly by BLM and FEDSIM:

- Implementation schedule
- Graphics loading
- CPU capacity
- Technology impacts

The following analyses of the cost factor include a description of the sensitivity issues, detailed cost impacts resulting from changing the assumption, and an indication of the change in benefits from changing the assumptions. Cost data is presented in tabular form. Each table includes life cycle expenditures for each cost element in both the base case (proposed system) and the case being analyzed. A third column presents the difference between the two cases. Positive figures in the "DIFFERENCE" column indicate that costs for the case being analyzed are higher than those in the base case. Negative figures (shown in parentheses) indicate that the costs for the case being analyzed are lower than those in the base case. Totals and differences for cost categories, cost element groups (capital investment, other non-recurring, recurring), all costs, and present value costs are also shown.

A. IMPLEMENTATION SCHEDULE

The implementation schedule developed by FEDSIM includes installation of ALMRS hardware and software at all state and district offices, independent (non-collocated) area offices, the DSC, and Headquarters. Various alternative implementation strategies involve initial installation of ALMRS at only a select subset of BLM sites. The term "uneven implementation" covers these alternatives. Uneven implementation provides an approach for installing ALMRS at key sites if budget limitations preclude full implementation of the initial version of ALMRS.

1. Description

FEDSIM examined several uneven implementation strategies and selected the approach of installing ALMRS at all sites within selected key states as the most viable form of uneven implementation. Options involving installation of ALMRS at only state offices or at only state and district offices were determined to be less appropriate. The following paragraphs describe FEDSIM's rationale for rejecting the alternative of installing ALMRS only at the state offices. The rationale for eliminating the alternative of automating only state and district offices is similar and represents a compromise between the two extremes.

If only state offices are automated, 60 percent of the workload would still be accomplished manually. The integrity of the automated data base at the state offices would be difficult to maintain, because district and area offices would place a priority on keeping their manual records current and would have no incentive to send updates to the state. Any updates provided to the state would be manual and would require labor-intensive input activities. The update of district and area office manual files based on automated data from the state offices would also be difficult to achieve.

Public user workload would tend to shift toward the automated state offices. This could cause a staffing imbalance, with low per person workloads at district and area offices and high per person workloads at state offices. An uneven level of service throughout each state would therefore result.

FEDSIM determined that the variation of this option involving the actual processing of area and district graphics workload at state offices would not be effective. Such an approach would require huge state computer centers supporting hundreds of graphics terminals. Cost savings associated with reducing the number of copies of required data bases and processing sites would be offset by the following inefficiencies and disadvantages:

- Double processing for queries would occur; formulation would be accomplished at the area and district offices; and input and data retrieval would be accomplished at the state offices.

- Delays in receiving responses at district and area offices would result, since the outputs would be mailed by state offices to these sites. These delays would be compounded by lack of user interaction and by the requirement for multiple steps to satisfy many queries.

- Mailing costs would increase significantly and, since all responses to district or area queries would have to be in hardcopy form, more plotters and graphic output devices would be required.

This option would be inconsistent with the current data processing trend of placing processing power at the locations where the workload originates.

FEDSIM examined two options of uneven implementation involving installation of ALMRS throughout selected key states. In the first option, the five states with the highest land and minerals record workload would have ALMRS installed at all state, district, and independent area offices. The five states known within BLM as the "OPEC" states because of their high levels of petroleum resources are Wyoming, New Mexico, Montana, Utah, and Colorado. In addition to these states, the DSC and Washington office would receive ALMRS capabilities.

In the second option, the four Eastern States sites would be added to this list because of the wide geographic coverage and need for automation.

In both these options, FEDSIM assumed that the ALMRS schedule used in the base case (proposed system detailed in Section V) would remain unchanged and that percentages of cost by year would also be the same. FEDSIM also assumed that data collection would be deferred for the states in which the initial version of ALMRS is not installed.

2. Cost Impacts

The costs of the two options involving uneven implementation are shown in Table VIII-1 (which covers the "OPEC" states only) and in Table VIII-2 (which adds the Eastern States sites to the initial implementation). As shown in Table VIII-1, total undiscounted costs decrease to $ 145.6 million, while total present value costs decrease to $ 84.9 million in the case involving ALMRS installation in the "OPEC" states. The resultant totals in the case which also automates the Eastern States sites are $ 162.7 million total undiscounted costs and $ 95.6 million total present value costs.

In both options, system development costs remain unchanged, since the entire ALMRS software capability must still be established. Reductions occur in the remaining cost categories: system configuration, communications, and operations. These reductions stem from the fact that processing configurations and communications capabilities are installed at only 70 sites in the "OPEC" option and 74 sites in the option which adds Eastern States (as opposed to 136 sites in the proposed system base

COST ELEMENT	BASE CASE TOTAL	SENSITIVITY TOTAL	DIFFERENCE TOTAL
1. SYSTEM DEVELOPMENT	$18,067,000	$18,067,000	$0
1.a INITIATION PHASE COMPLETION	$144,000	$144,000	$0
1.b SYSTEM DEFINITION	$864,000	$864,000	$0
1.c ACQUISITION MANAGEMENT	$904,000	$904,000	$0
1.d SYSTEM DESIGN	$3,240,000	$3,240,000	$0
1.e SYSTEM DEVELOPMENT/TEST	$12,915,000	$12,915,000	$0
2. SYSTEM CONFIGURATION	$70,336,260	$43,235,190	($27,101,070)
2.a PROCESSOR-TYPE A	$6,796,800	$5,097,600	($1,699,200)
2.b PROCESSOR-TYPE B	$6,600,000	$3,450,000	($3,150,000)
2.c PROCESSOR-TYPE C	$1,080,000	$270,000	($810,000)
2.d DISK STORAGE	$14,526,000	$7,263,000	($7,263,000)
2.e OFFLINE BACKUP	$93,000	$93,000	$0
2.f GRAPHICS TERMINAL	$38,850,000	$25,532,500	($13,317,500)
2.g DIGITIZER	$204,000	$105,000	($99,000)
2.h PLOTTER	$3,682,800	$2,283,600	($1,399,200)
2.i GRAPHICS HARDCOPY	$1,587,000	$1,020,000	($567,000)
2.j ALPHANUMERIC TERMINAL	$1,820,000	$1,260,000	($560,000)
2.k ALPHANUMERIC HARDCOPY	$1,983,600	$1,219,800	($763,800)
2.l MANAGEMENT TERMINAL/OUTPUT	$928,200	$444,600	($483,600)
2.m RESIDUAL VALUE	($7,815,140)	($4,803,910)	$3,011,230
3. COMMUNICATIONS	$12,421,198	$7,301,901	($5,119,297)
3.a BLM VOICE GRADE INVEST	$519,300	$267,300	($252,000)
3.b BLM VOICE GRADE RECUR	$3,998,708	$2,058,173	($1,940,536)
3.c DIAL UP INVEST	$162,960	$83,880	($79,080)
3.d DIAL UP RECUR	$5,867,514	$3,019,833	($2,847,681)
3.e DSC-HQ HIGH SPEED INVEST	$63,000	$63,000	$0
3.f DSC-HQ HIGH SPEED RECUR	$255,780	$255,780	$0
3.g EXT VOICE GRADE INVEST	$197,760	$197,760	$0
3.h EXT VOICE GRADE RECUR	$1,356,175	$1,356,175	$0
4. OPERATIONS	$140,107,671	$77,044,835	($63,062,836)
4.a DATA COLLECTION-GEOGRAPHIC	$19,000,000	$8,400,000	($10,600,000)
4.b DATA COLLECTION-OTHER	$25,900,000	$10,800,000	($15,100,000)
4.c SITE PREPARATION-TYPE A	$720,000	$540,000	($180,000)
4.d SITE PREPARATION-TYPE B	$1,760,000	$920,000	($840,000)
4.e SITE PREPARATION-TYPE C	$360,000	$90,000	($270,000)
4.f TRAINING	$548,000	$284,000	($264,000)
4.g OPERATIONS PERSONNEL	$20,403,200	$11,221,760	($9,181,440)
4.h SPACE LEASE/UTILITIES-TYPE A	$2,582,280	$1,936,710	($645,570)
4.i SPACE LEASE/UTILITIES-TYPE B	$6,312,240	$3,299,580	($3,012,660)
4.j SPACE LEASE/UTILITIES-TYPE C	$1,300,704	$325,176	($975,528)
4.k SUPPLIES-GRAPHICS	$2,264,160	$1,495,200	($768,960)
4.l SUPPLIES-ALPHANUMERIC	$1,469,568	$1,016,736	($452,832)
4.m SYSTEM CONFIGURATION MAINT	$54,127,519	$33,355,673	($20,771,846)
4.n APPLICATION SOFTWARE MAINT	$3,360,000	$3,360,000	$0
TOTAL CAPITAL INVESTMENT	$71,279,280	$43,847,130	($27,432,150)
TOTAL OTHER NON-RECURRING	$66,355,000	$39,101,000	($27,254,000)
TOTAL RECURRING	$103,297,848	$62,700,796	($40,597,052)
TOTAL ALL COSTS	$240,932,128	$145,648,926	($95,283,202)
PRESENT VALUE COST	$140,685,719	$84,929,768	($55,755,950)

SENSITIVITY COST COMPARISON
UNEVEN IMPLEMENTATION-OPEC STATES

TABLE VIII-1

COST ELEMENT	BASE CASE TOTAL	SENSITIVITY TOTAL	DIFFERENCE TOTAL
1. SYSTEM DEVELOPMENT	$18,067,000	$18,067,000	$0
1.a INITIATION PHASE COMPLETION	$144,000	$144,000	$0
1.b SYSTEM DEFINITION	$864,000	$864,000	$0
1.c ACQUISITION MANAGEMENT	$904,000	$904,000	$0
1.d SYSTEM DESIGN	$3,240,000	$3,240,000	$0
1.e SYSTEM DEVELOPMENT/TEST	$12,915,000	$12,915,000	$0
2. SYSTEM CONFIGURATION	$70,336,260	$47,968,200	($22,368,060)
2.a PROCESSOR-TYPE A	$6,796,800	$5,522,400	($1,274,400)
2.b PROCESSOR-TYPE B	$6,600,000	$3,600,000	($3,000,000)
2.c PROCESSOR-TYPE C	$1,080,000	$315,000	($765,000)
2.d DISK STORAGE	$14,526,000	$8,883,000	($5,643,000)
2.e OFFLINE BACKUP	$93,000	$93,000	$0
2.f GRAPHICS TERMINAL	$38,850,000	$28,070,000	($10,780,000)
2.g DIGITIZER	$204,000	$111,000	($93,000)
2.h PLOTTER	$3,682,800	$2,481,600	($1,201,200)
2.i GRAPHICS HARDCOPY	$1,587,000	$1,119,000	($468,000)
2.j ALPHANUMERIC TERMINAL	$1,820,000	$1,366,000	($454,000)
2.k ALPHANUMERIC HARDCOPY	$1,983,600	$1,276,800	($706,800)
2.l MANAGEMENT TERMINAL/OUTPUT	$928,200	$460,200	($468,000)
2.m RESIDUAL VALUE	($7,815,140)	($5,329,800)	$2,485,340
3. COMMUNICATIONS	$12,421,198	$7,612,208	($4,808,989)
3.a BLM VOICE GRADE INVEST	$519,300	$282,540	($236,760)
3.b BLM VOICE GRADE RECUR	$3,998,708	$2,175,810	($1,822,898)
3.c DIAL UP INVEST	$162,960	$88,680	($74,280)
3.d DIAL UP RECUR	$5,867,514	$3,192,463	($2,675,051)
3.e DSC-HQ HIGH SPEED INVEST	$63,000	$63,000	$0
3.f DSC-HQ HIGH SPEED RECUR	$255,780	$255,780	$0
3.g EXT VOICE GRADE INVEST	$197,760	$197,760	$0
3.h EXT VOICE GRADE RECUR	$1,356,175	$1,356,175	$0
4. OPERATIONS	$140,107,671	$89,040,347	($51,067,323)
4.a DATA COLLECTION-GEOGRAPHIC	$19,000,000	$11,200,000	($7,800,000)
4.b DATA COLLECTION-OTHER	$25,900,000	$15,100,000	($10,800,000)
4.c SITE PREPARATION-TYPE A	$720,000	$570,000	($150,000)
4.d SITE PREPARATION-TYPE B	$1,760,000	$960,000	($800,000)
4.e SITE PREPARATION-TYPE C	$360,000	$105,000	($255,000)
4.f TRAINING	$548,000	$300,000	($248,000)
4.g OPERATIONS PERSONNEL	$20,403,200	$11,859,360	($8,543,840)
4.h SPACE LEASE/UTILITIES-TYPE A	$2,582,280	$2,044,305	($537,975)
4.i SPACE LEASE/UTILITIES-TYPE B	$6,312,240	$3,443,040	($2,869,200)
4.j SPACE LEASE/UTILITIES-TYPE C	$1,300,704	$379,372	($921,332)
4.k SUPPLIES-GRAPHICS	$2,264,160	$1,623,360	($640,800)
4.l SUPPLIES-ALPHANUMERIC	$1,469,568	$1,102,176	($367,392)
4.m SYSTEM CONFIGURATION MAINT	$54,127,519	$36,993,734	($17,133,784)
4.n APPLICATION SOFTWARE MAINT	$3,360,000	$3,360,000	$0
TOTAL CAPITAL INVESTMENT	$71,279,280	$48,600,180	($22,679,100)
TOTAL OTHER NON-RECURRING	$66,355,000	$46,302,000	($20,053,000)
TOTAL RECURRING	$103,297,848	$67,785,576	($35,512,272)
TOTAL ALL COSTS	$240,932,128	$162,687,756	($78,244,372)
PRESENT VALUE COST	$140,685,719	$95,552,121	($45,133,597)

SENSITIVITY COST COMPARISON
UNEVEN IMPLEMENTATATION-OPEC AND EASTERN STATES

TABLE VIII-2

case). This also affects most cost elements in the operations category.

3. Benefit Impacts

The options involving uneven implementation also affect life cycle benefits. The portion of potential benefits associated with states that continue to operate in a manual mode would not be realized. Although FEDSIM did not calculate revised benefit/cost comparisons, it did examine these relationships at a general level. FEDSIM determined that certain costs (mainly those associated with system development) are unchanged in these options and that total costs do not decrease in direct proportion to the number of sites eliminated. Benefits decrease almost proportionately with decreased site automation. Thus, benefit cost comparisons are less favorable in the uneven implementation options than in the proposed system with full implementation.

B. GRAPHICS LOADING

Graphics terminals and output devices are a significant component of the system configuration cost estimates. The required quantity of these units is affected by one key factor: case and query volumes requiring graphics processing.

1. Description

FEDSIM examined the effect of varying the graphics workload volumes by analyzing the effects of increasing the graphics workload and the required number of graphics devices. A 50 percent increase in graphics workload would result in an FY1997 average daily load of approximately 100,000 query and 2,700 case processing graphics transactions.

FEDSIM also analyzed the effects of a 50 percent reduction in graphics workload. This would result in FY1997 average daily workload estimates for graphics processing of approximately 33,500 queries and 900 cases.

2. Cost Impacts

The increased costs associated with additional graphics devices are detailed in Table VIII-3. Along with the growth in expenditures for graphics devices, there are higher costs for the processors needed to support the increased device loads. Related operational costs for site preparation, operations personnel, space lease/utilities, graphics supplies, and configuration maintenance also increase over the base case. The total undiscounted costs for this option are $ 283.2 million, and the total present value costs are $ 163.4 million.

COST ELEMENT	BASE CASE TOTAL	SENSITIVITY TOTAL	DIFFERENCE TOTAL
1. SYSTEM DEVELOPMENT	$18,067,000	$18,067,000	$0
1.a INITIATION PHASE COMPLETION	$144,000	$144,000	$0
1.b SYSTEM DEFINITION	$864,000	$864,000	$0
1.c ACQUISITION MANAGEMENT	$904,000	$904,000	$0
1.d SYSTEM DESIGN	$3,240,000	$3,240,000	$0
1.e SYSTEM DEVELOPMENT/TEST	$12,915,000	$12,915,000	$0
2. SYSTEM CONFIGURATION	$70,336,260	$91,958,310	$21,622,050
2.a PROCESSOR-TYPE A	$6,796,800	$11,044,800	$4,248,000
2.b PROCESSOR-TYPE B	$6,600,000	$5,850,000	($750,000)
2.c PROCESSOR-TYPE C	$1,080,000	$900,000	($180,000)
2.d DISK STORAGE	$14,526,000	$14,526,000	$0
2.e OFFLINE BACKUP	$93,000	$93,000	$0
2.f GRAPHICS TERMINAL	$38,850,000	$57,627,500	$18,777,500
2.g DIGITIZER	$204,000	$204,000	$0
2.h PLOTTER	$3,682,800	$4,936,800	$1,254,000
2.i GRAPHICS HARDCOPY	$1,587,000	$2,262,000	$675,000
2.j ALPHANUMERIC TERMINAL	$1,820,000	$1,820,000	$0
2.k ALPHANUMERIC HARDCOPY	$1,983,600	$1,983,600	$0
2.l MANAGEMENT TERMINAL/OUTPUT	$928,200	$928,200	$0
2.m RESIDUAL VALUE	($7,815,140)	($10,217,590)	($2,402,450)
3. COMMUNICATIONS	$12,421,198	$12,421,198	$0
3.a BLM VOICE GRADE INVEST	$519,300	$519,300	$0
3.b BLM VOICE GRADE RECUR	$3,998,708	$3,998,708	$0
3.c DIAL UP INVEST	$162,960	$162,960	$0
3.d DIAL UP RECUR	$5,867,514	$5,867,514	$0
3.e DSC-HQ HIGH SPEED INVEST	$63,000	$63,000	$0
3.f DSC-HQ HIGH SPEED RECUR	$255,780	$255,780	$0
3.g EXT VOICE GRADE INVEST	$197,760	$197,760	$0
3.h EXT VOICE GRADE RECUR	$1,356,175	$1,356,175	$0
4. OPERATIONS	$140,107,671	$160,708,960	$20,601,290
4.a DATA COLLECTION-GEOGRAPHIC	$19,000,000	$19,000,000	$0
4.b DATA COLLECTION-OTHER	$25,900,000	$25,900,000	$0
4.c SITE PREPARATION-TYPE A	$720,000	$1,140,000	$420,000
4.d SITE PREPARATION-TYPE B	$1,760,000	$1,560,000	($200,000)
4.e SITE PREPARATION-TYPE C	$360,000	$300,000	($60,000)
4.f TRAINING	$548,000	$548,000	$0
4.g OPERATIONS PERSONNEL	$20,403,200	$22,188,480	$1,785,280
4.h SPACE LEASE/UTILITIES-TYPE A	$2,582,280	$4,088,610	$1,506,330
4.i SPACE LEASE/UTILITIES-TYPE B	$6,312,240	$5,594,940	($717,300)
4.j SPACE LEASE/UTILITIES-TYPE C	$1,300,704	$1,083,920	($216,784)
4.k SUPPLIES-GRAPHICS	$2,264,160	$3,417,600	$1,153,440
4.l SUPPLIES-ALPHANUMERIC	$1,469,568	$1,469,568	$0
4.m SYSTEM CONFIGURATION MAINT	$54,127,519	$71,057,842	$16,930,324
4.n APPLICATION SOFTWARE MAINT	$3,360,000	$3,360,000	$0
TOTAL CAPITAL INVESTMENT	$71,279,280	$92,901,330	$21,622,050
TOTAL OTHER NON-RECURRING	$66,355,000	$66,515,000	$160,000
TOTAL RECURRING	$103,297,848	$123,739,138	$20,441,290
TOTAL ALL COSTS	$240,932,128	$283,155,468	$42,223,340
PRESENT VALUE COST	$140,685,719	$163,380,432	$22,694,713

SENSITIVITY COST COMPARISON
INCREASED GRAPHICS LOAD

TABLE VIII-3

Table VIII-4 shows the decreased costs that result from a reduced graphics load. Again, processor expenditures and most operational cost elements are also affected (in this case, decreased). The total undiscounted costs for this option are $ 203.2 million, and the total present value costs are $ 120.3 million.

3. Benefit Impacts

There are no benefit impacts associated with these options. Analyses are based on the premises that the workload processed in these options represents the total load and that all user requirements are met.

C. CPU CAPACITY

FEDSIM used representative CPUs to determine unit prices for the three processor types and made assumptions about the number of terminals and volume of storage that could be supported by each type. The number of simultaneous terminals that could receive appropriate service (i.e., response times) from a CPU depends on the type of activity being performed by the terminal and the intelligence built into the terminal. Thus, the processing capacity needed to support a given number of terminals is application- dependent.

1. Description

FEDSIM assumed that a relatively high number of terminals and volume of online storage could be supported by the ALMRS central processors because a significant portion of the processing would be accomplished by the intelligent graphics workstations. Since ALMRS software has not yet been developed, the exact processing mix cannot be defined. FEDSIM also examined the effect of increasing the processing power of each type of CPU to accommodate the possibility that prototype results would indicate that it is inappropriate to use intelligent graphics workstations. Specifically, FEDSIM examined the following CPU processing power increases:

- Type A - Increase from VAX 11/785 to VAX 8600
- Type B - Increase from VAX 11/750 to VAX 11/785
- Type C - Increase from VAX 11/730 to VAX 11/750

2. Cost Impacts

The increased costs associated with more powerful processor configurations are detailed in Table VIII-5. As shown, increases

COST ELEMENT	BASE CASE TOTAL	SENSITIVITY TOTAL	DIFFERENCE TOTAL
1. SYSTEM DEVELOPMENT	$18,067,000	$18,067,000	$0
1.a INITIATION PHASE COMPLETION	$144,000	$144,000	$0
1.b SYSTEM DEFINITION	$864,000	$864,000	$0
1.c ACQUISITION MANAGEMENT	$904,000	$904,000	$0
1.d SYSTEM DESIGN	$3,240,000	$3,240,000	$0
1.e SYSTEM DEVELOPMENT/TEST	$12,915,000	$12,915,000	$0
2. SYSTEM CONFIGURATION	$70,336,260	$50,217,570	($20,118,690)
2.a PROCESSOR-TYPE A	$6,796,800	$4,885,200	($1,911,600)
2.b PROCESSOR-TYPE B	$6,600,000	$6,375,000	($225,000)
2.c PROCESSOR-TYPE C	$1,080,000	$1,440,000	$360,000
2.d DISK STORAGE	$14,526,000	$14,526,000	$0
2.e OFFLINE BACKUP	$93,000	$93,000	$0
2.f GRAPHICS TERMINAL	$38,850,000	$20,072,500	($18,777,500)
2.g DIGITIZER	$204,000	$204,000	$0
2.h PLOTTER	$3,682,800	$2,560,800	($1,122,000)
2.i GRAPHICS HARDCOPY	$1,587,000	$909,000	($678,000)
2.j ALPHANUMERIC TERMINAL	$1,820,000	$1,820,000	$0
2.k ALPHANUMERIC HARDCOPY	$1,983,600	$1,983,600	$0
2.l MANAGEMENT TERMINAL/OUTPUT	$928,200	$928,200	$0
2.m RESIDUAL VALUE	($7,815,140)	($5,579,730)	$2,235,410
3. COMMUNICATIONS	$12,421,198	$12,421,198	$0
3.a BLM VOICE GRADE INVEST	$519,300	$519,300	$0
3.b BLM VOICE GRADE RECUR	$3,998,708	$3,998,708	$0
3.c DIAL UP INVEST	$162,960	$162,960	$0
3.d DIAL UP RECUR	$5,867,514	$5,867,514	$0
3.e DSC-HQ HIGH SPEED INVEST	$63,000	$63,000	$0
3.f DSC-HQ HIGH SPEED RECUR	$255,780	$255,780	$0
3.g EXT VOICE GRADE INVEST	$197,760	$197,760	$0
3.h EXT VOICE GRADE RECUR	$1,356,175	$1,356,175	$0
4. OPERATIONS	$140,107,671	$122,458,600	($17,649,070)
4.a DATA COLLECTION-GEOGRAPHIC	$19,000,000	$19,000,000	$0
4.b DATA COLLECTION-OTHER	$25,900,000	$25,900,000	$0
4.c SITE PREPARATION-TYPE A	$720,000	$570,000	($150,000)
4.d SITE PREPARATION-TYPE B	$1,760,000	$1,700,000	($60,000)
4.e SITE PREPARATION-TYPE C	$360,000	$480,000	$120,000
4.f TRAINING	$548,000	$548,000	$0
4.g OPERATIONS PERSONNEL	$20,403,200	$19,765,600	($637,600)
4.h SPACE LEASE/UTILITIES-TYPE A	$2,582,280	$2,044,305	($537,975)
4.i SPACE LEASE/UTILITIES-TYPE B	$6,312,240	$6,097,050	($215,190)
4.j SPACE LEASE/UTILITIES-TYPE C	$1,300,704	$1,734,272	$433,568
4.k SUPPLIES-GRAPHICS	$2,264,160	$1,495,200	($768,960)
4.l SUPPLIES-ALPHANUMERIC	$1,469,568	$1,469,568	$0
4.m SYSTEM CONFIGURATION MAINT	$54,127,519	$38,294,605	($15,832,913)
4.n APPLICATION SOFTWARE MAINT	$3,360,000	$3,360,000	$0
TOTAL CAPITAL INVESTMENT	$71,279,280	$51,160,590	($20,118,690)
TOTAL OTHER NON-RECURRING	$66,355,000	$66,265,000	($90,000)
TOTAL RECURRING	$103,297,848	$85,738,778	($17,559,070)
TOTAL ALL COSTS	$240,932,128	$203,164,368	($37,767,760)
PRESENT VALUE COST	$140,685,719	$120,328,855	($20,356,864)

SENSITIVITY COST COMPARISON
DECREASED GRAPHICS LOAD

TABLE VIII-4

COST ELEMENT	BASE CASE TOTAL	SENSITIVITY TOTAL	DIFFERENCE TOTAL
1. SYSTEM DEVELOPMENT	$18,067,000	$18,067,000	$0
1.a INITIATION PHASE COMPLETION	$144,000	$144,000	$0
1.b SYSTEM DEFINITION	$864,000	$864,000	$0
1.c ACQUISITION MANAGEMENT	$904,000	$904,000	$0
1.d SYSTEM DESIGN	$3,240,000	$3,240,000	$0
1.e SYSTEM DEVELOPMENT/TEST	$12,915,000	$12,915,000	$0
2. SYSTEM CONFIGURATION	$70,336,260	$80,136,180	$9,799,920
2.a PROCESSOR-TYPE A	$6,796,800	$9,772,800	$2,976,000
2.b PROCESSOR-TYPE B	$6,600,000	$14,044,800	$7,444,800
2.c PROCESSOR-TYPE C	$1,080,000	$1,548,000	$468,000
2.d DISK STORAGE	$14,526,000	$14,526,000	$0
2.e OFFLINE BACKUP	$93,000	$93,000	$0
2.f GRAPHICS TERMINAL	$38,850,000	$38,850,000	$0
2.g DIGITIZER	$204,000	$204,000	$0
2.h PLOTTER	$3,682,800	$3,682,800	$0
2.i GRAPHICS HARDCOPY	$1,587,000	$1,587,000	$0
2.j ALPHANUMERIC TERMINAL	$1,820,000	$1,820,000	$0
2.k ALPHANUMERIC HARDCOPY	$1,983,600	$1,983,600	$0
2.l MANAGEMENT TERMINAL/OUTPUT	$928,200	$928,200	$0
2.m RESIDUAL VALUE	($7,815,140)	($8,904,020)	($1,088,880)
3. COMMUNICATIONS	$12,421,198	$12,421,198	$0
3.a BLM VOICE GRADE INVEST	$519,300	$519,300	$0
3.b BLM VOICE GRADE RECUR	$3,998,708	$3,998,708	$0
3.c DIAL UP INVEST	$162,960	$162,960	$0
3.d DIAL UP RECUR	$5,867,514	$5,867,514	$0
3.e DSC-HQ HIGH SPEED INVEST	$63,000	$63,000	$0
3.f DSC-HQ HIGH SPEED RECUR	$255,780	$255,780	$0
3.g EXT VOICE GRADE INVEST	$197,760	$197,760	$0
3.h EXT VOICE GRADE RECUR	$1,356,175	$1,356,175	$0
4. OPERATIONS	$140,107,671	$147,376,313	$7,268,642
4.a DATA COLLECTION-GEOGRAPHIC	$19,000,000	$19,000,000	$0
4.b DATA COLLECTION-OTHER	$25,900,000	$25,900,000	$0
4.c SITE PREPARATION-TYPE A	$720,000	$720,000	$0
4.d SITE PREPARATION-TYPE B	$1,760,000	$1,760,000	$0
4.e SITE PREPARATION-TYPE C	$360,000	$360,000	$0
4.f TRAINING	$548,000	$548,000	$0
4.g OPERATIONS PERSONNEL	$20,403,200	$20,403,200	$0
4.h SPACE LEASE/UTILITIES-TYPE A	$2,582,280	$2,582,280	$0
4.i SPACE LEASE/UTILITIES-TYPE B	$6,312,240	$6,312,240	$0
4.j SPACE LEASE/UTILITIES-TYPE C	$1,300,704	$1,300,704	$0
4.k SUPPLIES-GRAPHICS	$2,264,160	$2,264,160	$0
4.l SUPPLIES-ALPHANUMERIC	$1,469,568	$1,469,568	$0
4.m SYSTEM CONFIGURATION MAINT	$54,127,519	$61,396,161	$7,268,642
4.n APPLICATION SOFTWARE MAINT	$3,360,000	$3,360,000	$0
TOTAL CAPITAL INVESTMENT	$71,279,280	$81,079,200	$9,799,920
TOTAL OTHER NON-RECURRING	$66,355,000	$66,355,000	$0
TOTAL RECURRING	$103,297,848	$110,566,490	$7,268,642
TOTAL ALL COSTS	$240,932,128	$258,000,690	$17,068,562
PRESENT VALUE COST	$140,685,719	$150,412,820	$9,727,101

SENSITIVITY COST COMPARISON
CPU CAPACITY UPGRADE

are limited to the processor and hardware maintenance cost elements. FEDSIM assumed that site costs would not increase, because the physical size difference between processors is not significant. The total undiscounted costs for this case are $ 258 million and the total present value costs are $ 150.4 million.

3. Benefit Impacts

There are no benefit impacts associated with this case.

D. TECHNOLOGY IMPACTS

FEDSIM used unit prices available in the current marketplace as the basis for cost estimation. As detailed in Appendix E, this approach represents a conservative approach for ADP hardware components, since ADP equipment costs are projected to continue to decrease based on technological advances over the next decade.

1. Description

In this sensitivity analysis, FEDSIM assumed that technology advances would result in a 20 percent reduction in the unit prices of all cost elements in the system configuration category. This is still a conservative estimate based on the cost history of data processing components and forecast trends. FEDSIM did not reduce communications cost elements, since the decreases in this area are not as certain as they are for ADP hardware. FEDSIM also assumed that maintenance costs, which are largely personnel-based, would remain unchanged from the base case.

2. Cost Impacts

The decreased costs associated with lower unit prices because of technology advances are detailed in Table VIII-6. As shown, reductions in life cycle expenditures for all system configuration costs elements result in total undiscounted costs of $ 226.9 million and total present value costs of $ 131.8 million.

3. Benefit Impacts

There are no benefit impacts associated with this case.

COST ELEMENT	BASE CASE TOTAL	SENSITIVITY TOTAL	DIFFERENCE TOTAL
1. SYSTEM DEVELOPMENT	$18,067,000	$18,067,000	$0
1.a INITIATION PHASE COMPLETION	$144,000	$144,000	$0
1.b SYSTEM DEFINITION	$864,000	$864,000	$0
1.c ACQUISITION MANAGEMENT	$904,000	$904,000	$0
1.d SYSTEM DESIGN	$3,240,000	$3,240,000	$0
1.e SYSTEM DEVELOPMENT/TEST	$12,915,000	$12,915,000	$0
2. SYSTEM CONFIGURATION	$70,336,260	$56,269,008	($14,067,252)
2.a PROCESSOR-TYPE A	$6,796,800	$5,437,440	($1,359,360)
2.b PROCESSOR-TYPE B	$6,600,000	$5,280,000	($1,320,000)
2.c PROCESSOR-TYPE C	$1,080,000	$864,000	($216,000)
2.d DISK STORAGE	$14,526,000	$11,620,800	($2,905,200)
2.e OFFLINE BACKUP	$93,000	$74,400	($18,600)
2.f GRAPHICS TERMINAL	$38,850,000	$31,080,000	($7,770,000)
2.g DIGITIZER	$204,000	$163,200	($40,800)
2.h PLOTTER	$3,682,800	$2,946,240	($736,560)
2.i GRAPHICS HARDCOPY	$1,587,000	$1,269,600	($317,400)
2.j ALPHANUMERIC TERMINAL	$1,820,000	$1,456,000	($364,000)
2.k ALPHANUMERIC HARDCOPY	$1,983,600	$1,586,880	($396,720)
2.l MANAGEMENT TERMINAL/OUTPUT	$928,200	$742,560	($185,640)
2.m RESIDUAL VALUE	($7,815,140)	($6,252,112)	$1,563,028
3. COMMUNICATIONS	$12,421,198	$12,421,198	$0
3.a BLM VOICE GRADE INVEST	$519,300	$519,300	$0
3.b BLM VOICE GRADE RECUR	$3,998,708	$3,998,708	$0
3.c DIAL UP INVEST	$162,960	$162,960	$0
3.d DIAL UP RECUR	$5,867,514	$5,867,514	$0
3.e DSC-HQ HIGH SPEED INVEST	$63,000	$63,000	$0
3.f DSC-HQ HIGH SPEED RECUR	$255,780	$255,780	$0
3.g EXT VOICE GRADE INVEST	$197,760	$197,760	$0
3.h EXT VOICE GRADE RECUR	$1,356,175	$1,356,175	$0
4. OPERATIONS	$140,107,671	$140,107,671	$0
4.a DATA COLLECTION-GEOGRAPHIC	$19,000,000	$19,000,000	$0
4.b DATA COLLECTION-OTHER	$25,900,000	$25,900,000	$0
4.c SITE PREPARATION-TYPE A	$720,000	$720,000	$0
4.d SITE PREPARATION-TYPE B	$1,760,000	$1,760,000	$0
4.e SITE PREPARATION-TYPE C	$360,000	$360,000	$0
4.f TRAINING	$548,000	$548,000	$0
4.g OPERATIONS PERSONNEL	$20,403,200	$20,403,200	$0
4.h SPACE LEASE/UTILITIES-TYPE A	$2,582,280	$2,582,280	$0
4.i SPACE LEASE/UTILITIES-TYPE B	$6,312,240	$6,312,240	$0
4.j SPACE LEASE/UTILITIES-TYPE C	$1,300,704	$1,300,704	$0
4.k SUPPLIES-GRAPHICS	$2,264,160	$2,264,160	$0
4.l SUPPLIES-ALPHANUMERIC	$1,469,568	$1,469,568	$0
4.m SYSTEM CONFIGURATION MAINT	$54,127,519	$54,127,519	$0
4.n APPLICATION SOFTWARE MAINT	$3,360,000	$3,360,000	$0
TOTAL CAPITAL INVESTMENT	$71,279,280	$57,212,028	($14,067,252)
TOTAL OTHER NON-RECURRING	$66,355,000	$66,355,000	$0
TOTAL RECURRING	$103,297,848	$103,297,848	$0
TOTAL ALL COSTS	$240,932,128	$226,864,876	($14,067,252)
PRESENT VALUE COST	$140,685,719	$131,817,166	($8,868,552)

SENSITIVITY COST COMPARISON
TECHNOLOGY IMPACT

TABLE VIII-6

IX. CONCLUSIONS AND RECOMMENDATIONS

A. ALMRS ALTERNATIVES ANALYSIS COMPLETES INITIATION PHASE

The alternatives analysis conducted to complete this Technical Product completes the initiation phase guidelines provided in FIPS PUB 64. FEDSIM concludes that this document completes the Initiation Phase Documentation requirements of ALMRS. FEDSIM recommends that BLM management evaluate ALMRS and decide on ALMRS development.

B. ALMRS DEVELOPMENT FEASIBLE

An integral part of this alternatives analysis was a survey of the technology available for ALMRS development. Based upon the technology review, FEDSIM concludes that the development of ALMRS is feasible with current technology. Certain aspects of the software development, notably the unstructured graphics storage and graphics storage compression, will require further development to perfect these capabilities. FEDSIM recommends that BLM demonstrate ALMRS feasibility by developing a prototype.

C. PROPOSED DISTRIBUTED SYSTEM MOST BENEFICIAL

In the Alternatives Analysis, FEDSIM evaluated six alternatives. The distributed alternative presented in Section V provided the best benefit/cost ratio for BLM and other agencies of all alternatives presented. FEDSIM concludes that the proposed system described in Section V is the best alternative for ALMRS development given the current state of ADP and telecommunications technology. FEDSIM recommends that future development be directed towards this alternative, but should not be used to exclude vendor offering that meet ALMRS requirements at reduced life cycle costs.

D. ALMRS USERS SHOULD CONTINUE VERIFYING & REFINING THE INFORMATION IN THIS DOCUMENT

ALMRS functional requirements were defined using material and verbal information and direction provided by the ALMRS Project Office. ALMRS functional requirements were used to conduct the Alternatives Analysis. In conducting this project, FEDSIM assumed that the ALMRS Project Office adequately represented the ALMRS users. FEDSIM concludes that continued user participation and validation is required to assure that the information in this document accurately reflects user requirements. FEDSIM recommends that DSC work with current system users and potential ALMRS users to continue verifying and refining the information contained in this document.

E. AUTOMATION OF GRAPHICS AND QUERY FUNCTIONS APPEARS TO OFFER HIGH PAYOFFS

Based on analysis of workload and current system problems, FEDSIM concludes that responding to queries and providing accurate, timely graphics are the most burdensome functions of the current system and currently have the least automated support. Since these are high-volume areas with little automated support, automation of the graphics and query functions appears to offer greater potential for payoff than does automation of other functions. FEDSIM recommends that BLM assign query functions and graphics capabilities the highest priorities in their development of ALMRS.

F. ALMRS PROCUREMENT SHOULD BE FUNCTIONALLY BASED

The selection of the proposed system presented in Section V was based on:

- The proposed system met all ALMRS requirements
- The proposed system was the least costly Alternative Analyzed.

ADP and Telecommunications technology and costs are undergoing rapid change. Vendors are providing increased functionality at reduced costs. FEDSIM concludes that BLM should use the proposed system for costing purposes only. FEDSIM recommends the use of a functional RFP that will not limit vendor offerings to any one configuration or technology.

APPENDIX A

TABLES DESCRIBING CURRENT SYSTEM WORKLOAD

A.1 Current District and Area Offices Alphanumeric Terminals and Printers

Table A-1, "Current District and Area Offices Alphanumeric Terminals and Printers," shows the current number of available alphanumeric (non-graphic) terminals and printers and their locations. This table is divided into three columns. The first column lists the state and the State Office, District Offices and Area Offices for that state. Column two lists the number of interactive terminals and column three lists the number of printers. These devices would have to be modified in order to display spatial graphics.

The left column of this table lists each BLM office, grouped by state. The State, District, and Area offices are listed under each state. Each office beginning at the left margin is a unique, separate location. The offices listed with their names indented are co-located; i.e., physically located together. The office marked with a leading asterisk is the primary office of the co-located offices. The row marked "Co-location Total" is the sum for each column of the co-located offices. The total for all offices including co-located offices are listed along the left margin.

The 212 BLM offices are located in 137 places. The offices in each state are grouped together between dashed lines. The row with the state name contains the state subtotal for each of the columns. The data for co-locating the sites was provided by the Denver Service Center (DSC) in a letter dated September 13, 1985. The table providing the data is titled "Revision of Table V-4: BLM ALMRS Users-FTE."

The columns headed "No. of Alphanumeric Terminals" and "No. of Printers" show the number of terminals and printers, respectively, at each BLM office below the State Office level. The number of terminals and printers is subtotaled for each co-located office and totaled for each state. This information is current as of March, 1985. The data for the number and distribution of terminals came from the "ALMRS Equipment Analysis" performed by each state in March, 1985.

OFFICE	NO. OF ALPHANUMERIC TERMINALS	NO. OF PRINTERS
Arizona	15	11
Arizona State Office		
Arizona Strip DO	2	2
*Vermillon RA	0	0
Shivwits RA	0	0
Dixie RA (Utah)	1	1
Colocation Total	1	1
*Phoenix DO	3	2
Lower Gila RA	0	0
Phoenix RA	0	0
Colocation Total	3	2
Kingman RA	2	1
*Safford DO	3	2
San Simon RA	0	0
Gila RA	0	0
Colocation Total	3	2
*Yuma DO	2	2
Yuma RA	1	0
Colocation Total	3	2
Havasu RA	1	1
California	0	0
California State Office		
Bakersfield DO	0	0
Bishop RA	0	0
Caliente RA	0	0
Folsom RA	0	0
Hollister RA	0	0
Susanville DO	0	0
Eagle Lake RA	0	0
Cedarville RA	0	0
Alturas RA	0	0
*Ukiah DO	0	0
Clear Lake RA	0	0
Colocation Total	0	0
Arcata RA	0	0
Redding RA	0	0
California Desert DO	0	0
El Centro RA	0	0
Barstow RA	0	0
Indio RA	0	0
Needles RA	0	0
Ridgecrest RA	0	0

CURRENT DISTRICT AND AREA OFFICE
ALPHANUMERIC TERMINALS AND PRINTERS

TABLE A-1

OFFICE	NO. OF ALPHANUMERIC TERMINALS	NO. OF PRINTERS
Colorado	9	15
Colorado State Office		
Canon City DO	2	4
Northeast RA	0	0
San Luis RA	0	0
Royal Gorge RA	0	0
Craig DO	2	3
Kremmling RA	0	0
White River RA	0	0
Little Snake RA	0	0
*Grand Junction DO	1	4
Grand Junction RA	0	0
Colocation Total	1	4
Glenwood Springs RA	0	0
*Montrose DO	4	4
Uncompahgre Basin RA	0	0
Colocation Total	4	4
Gunnison Basin RA	0	0
San Juan RA	0	0
Eastern States	2	2
Eastern States Office		
Jackson DO	1	1
Milwaukee DO	1	1
Rolla RA	0	0
Idaho	0	0
Idaho State Office		
*Boise DO	0	0
Cascade RA	0	0
Owyhee RA	0	0
Bruneau RA	0	0
Jarbidge RA	0	0
Colocation Total	0	0
*Burley DO	0	0
Deep Creek RA	0	0
Snake River RA	0	0
Colocation Total	0	0
*Coeur d'Alene DO	0	0
Emerald Empire RA	0	0
Colocation Total	0	0
Cottonwood RA	0	0
*Idaho Falls DO	0	0
Big Butte RA	0	0
Medicine Lodge RA	0	0

CURRENT DISTRICT AND AREA OFFICE
ALPHANUMERIC TERMINALS AND PRINTERS

TABLE A-1 (Continued)

OFFICE	NO. OF ALPHANUMERIC TERMINALS	NO. OF PRINTERS
Colocation Total	0	0
Pocatello RA	0	0
*Salmon DO	0	0
Lemhi RA	0	0
Challis RA	0	0
Colocation Total	0	0
*Shoshone DO	0	0
Monument RA	0	0
Bennett Hills RA	0	0
Colocation Total	0	0
Montana	12	12
Montana State Office		
*Butte DO	1	1
Headwaters RA	0	0
Colocation Total	1	1
Dillon RA	1	1
Garnet RA	0	0
Miles City DO	1	1
*Big Dry RA	1	1
Powder River RA	0	0
Colocation Total	1	1
South Dakota RA	0	0
Billings RA	1	1
Dickinson DO	1	1
*Lewistown DO	1	1
Judith RA	1	1
Colocation Total	2	2
Phillips RA	1	1
Havre RA	1	1
Valley RA	1	1
Great Falls RA	1	1
Nevada	0	0
Nevada State Office		
*Battle Mountain DO	0	0
Shoshone-Eureka RA	0	0
Colocation Total	0	0
Tonopah RA	0	0
*Carson City DO	0	0
Lahontan RA	0	0
Walker RA	0	0
Colocation Total	0	0
*Elko DO	0	0
Elko RA	0	0

CURRENT DISTRICT AND AREA OFFICE
ALPHANUMERIC TERMINALS AND PRINTERS

TABLE A-1 (Continued)

OFFICE	NO. OF ALPHANUMERIC TERMINALS	NO. OF PRINTERS
Wells RA	0	0
Colocation Total	0	0
*Ely DO	0	0
Egan RA	0	0
Schell RA	0	0
Colocation Total	0	0
Las Vegas DO	0	0
Stateline-Esmeralda RA	0	0
Caliente RA	0	0
*Winnemucca DO	0	0
Paradise-Denio RA	0	0
Sonoma-Gerlach RA	0	0
Colocation Total	0	0
New Mexico	0	0
New Mexico State Office		
Albuquerque DO	0	0
Rio Peuerco RA	0	0
Farmington RA	0	0
Taos RA	0	0
*Las Cruces DO	0	0
Las Cruces/Lordsburg RA	0	0
White Sands RA	0	0
Colocation Total	0	0
Socorro RA	0	0
Tulsa DO	0	0
Oklahoma RA	0	0
Roswell DO	0	0
Roswell RA	0	0
Carlsbad RA	0	0
Oregon	14	14
Oregon State Office		
*Burns DO	1	1
Three Rivers RA	0	0
Andrews RA	0	0
Colocation Total	1	1
*Coos Bay DO	1	1
Myrtlewood RA	0	0
Tioga RA	0	0
Umpqua RA	0	0
Colocation Total	1	1
*Eugene DO	1	1
Noti RA	0	0
Dorena RA	0	0

CURRENT DISTRICT AND AREA OFFICE
ALPHANUMERIC TERMINALS AND PRINTERS

TABLE A-1 (Continued)

OFFICE	NO. OF ALPHANUMERIC TERMINALS	NO. OF PRINTERS
Mohawk RA	0	0
Colocation Total	1	1
Lorane RA	0	1
*Lakeview DO	1	1
Warner Lake RA	0	0
High Desert RA	0	0
Colocation Total	1	1
Klamath Falls RA	1	0
*Medford DO	1	1
Klamath RA	1	1
Butte Falls RA	0	0
Jacksonville RA	0	0
Grants Pass RA	0	0
Glendale RA	0	0
Colocation Total	2	2
*Prineville DO	1	1
Central Oregon RA	0	0
Deschutes RA	0	0
Colocation Total	1	1
*Roseburg DO	1	1
North Umpqua RA	0	0
South Umpqua RA	0	0
Dillard RA	0	0
Drain RA	0	0
Colocation Total	1	1
*Salem DO	1	1
Santiam RA	0	0
Alsea RA	0	0
Yamhill RA	0	0
Clackamas RA	0	0
Colocation Total	1	1
Tillamook RA	1	1
*Spokane DO	1	1
Border RA	0	0
Colocation Total	1	1
Wenatchee RA	0	0
*Vale DO	1	1
N. Malheur RA	0	0
S. Malheur RA	0	0
Colocation Total	1	1
Baker RA	1	1
Utah	25	21
Utah State Office		
*Salt Lake DO	2	3

CURRENT DISTRICT AND AREA OFFICE
ALPHANUMERIC TERMINALS AND PRINTERS

TABLE A-1 (Continued)

OFFICE	NO. OF ALPHANUMERIC TERMINALS	NO. OF PRINTERS
Bear River RA	0	0
Pony Express RA	0	0
Colocation Total	2	3
Cedar City DO	4	2
Kanab RA	1	1
Escalante RA	1	1
Beaver River RA	1	1
Richfield DO	3	2
*Warm Springs RA	1	0
House Range RA	0	1
Colocation Total	1	1
Henry Mountain RA	1	1
Sevier River RA	1	1
Moab DO	4	3
San Juan RA	1	0
Grand RA	0	0
*Price River RA	2	2
San Rafael RA	0	0
Colocation Total	2	2
*Vernal DO	3	3
Diamond Mountain RA	0	0
Book Cliffs RA	0	0
Colocation Total	3	3
Wyoming	27	11
Wyoming State Office		
Casper DO	2	1
Platte River RA	2	1
Buffalo RA	2	1
Newcastle RA	3	1
Rawlins DO	1	1
*Divide RA	1	0
Medicine Bow RA	1	1
Colocation Total	2	1
Lander RA	3	1
Rock Springs DO	1	0
*Big Sandy RA	1	1
Salt Wells RA	1	0
Colocation Total	2	1
Kemmerer RA	3	1
Pinedale RA	3	1
*Worland DO	1	0
Grass Creek RA	1	1
Washakie RA	0	0
Colocation Total	2	1

CURRENT DISTRICT AND AREA OFFICE
ALPHANUMERIC TERMINALS AND PRINTERS

TABLE A-1 (Continued)

OFFICE	NO. OF ALPHANUMERIC TERMINALS	NO. OF PRINTERS
Cody RA	1	0
TOTAL	104	86

CURRENT DISTRICT AND AREA OFFICE
ALPHANUMERIC TERMINALS AND PRINTERS

TABLE A-1 (Continued)

A.2 BLM Non-Management Users by User Class

Table A-2, "BLM Non-Management Users by User Class," shows the actual number of non-management personnel that use the current system on a full-time or part-time basis.

The BLM offices are listed in the left column of this table. The State, District, and Area Office sites are listed under each state using the same techniques used for Table A-1. Not all users use the current system full time. Table A-3 translates the actual number of users into the number of full time equivalents users.

Table A-2 was derived from data provided by the DSC in a letter dated September 13, 1985. The table providing the data is titled "Revision of Table V-4: BLM ALMRS Users - FTE."

OFFICES	LANDS & MINERALS USERS	RECORDS USERS	OTHER USERS	TOTAL USERS
Headquarters	116	5	67	188
Denver Service Center	15	10	10	35
Arizona	87	9	56	152
Arizona State Office	43	9	20	72
Arizona Strip DO	4	0	3	7
*Vermillon RA	1	0	1	2
Shivwits RA	3	0	2	5
Dixie RA (Utah)	1	0	1	2
Colocation Total	5	0	4	9
*Phoenix DO	11	0	8	19
Lower Gila RA	2	0	2	4
Phoenix RA	3	0	2	5
Colocation Total	16	0	12	28
Kingman RA	6	0	4	10
*Safford DO	3	0	4	7
San Simon RA	2	0	2	4
Gila RA	2	0	2	4
Colocation Total	7	0	8	15
*Yuma DO	4	0	3	7
Yuma RA	1	0	1	2
Colocation Total	5	0	4	9
Havasu RA	1	0	1	2
California	134	22	94	250
California State Office	48	22	28	98
Bakersfield DO	23	0	8	31
Bishop RA	1	0	1	2
Caliente RA	2	0	2	4
Folsom RA	3	0	3	6
Hollister RA	2	0	2	4
Susanville DO	5	0	10	15
Eagle Lake RA	2	0	2	4
Cedarville RA	2	0	2	4
Alturas RA	2	0	2	4
*Ukiah DO	6	0	5	11
Clear Lake RA	3	0	1	4
Colocation Total	9	0	6	15
Arcata RA	3	0	2	5
Redding RA	7	0	3	10
California Desert DO	11	0	9	20
El Centro RA	3	0	3	6
Barstow RA	4	0	3	7
Indio RA	3	0	2	5
Needles RA	2	0	3	5

BLM NON-MANAGEMENT USERS
BY USER CLASS

TABLE A-2

OFFICES	LANDS & MINERALS USERS	RECORDS USERS	OTHER USERS	TOTAL USERS
Ridgecrest RA	2	0	3	5
Colorado	217	22	86	325
Colorado State Office	92	22	28	142
Canon City DO	7	0	5	12
Northeast RA	5	0	1	6
San Luis RA	0	0	2	2
Royal Gorge RA	4	0	4	8
Craig DO	19	0	8	27
Kremmling RA	1	0	4	5
White River RA	23	0	4	27
Little Snake RA	10	0	3	13
*Grand Junction DO	14	0	7	21
Grand Junction RA	12	0	6	18
Colocation Total	26	0	13	39
Glenwood Springs RA	4	0	3	7
*Montrose DO	6	0	5	11
Uncompahgre Basin RA	7	0	2	9
Colocation Total	13	0	7	20
Gunnison Basin RA	2	0	1	3
San Juan RA	11	0	3	14
Eastern States	102	5	23	130
Eastern States Office	55	4	18	77
Jackson DO	23	0	2	25
Milwaukee DO	22	0	3	25
Rolla RA	2	1	0	3
Idaho	78	12	63	153
Idaho State Office	30	12	16	58
*Boise DO	7	0	9	16
Cascade RA	1	0	1	2
Owyhee RA	2	0	2	4
Bruneau RA	1	0	2	3
Jarbidge RA	3	0	2	5
Colocation Total	14	0	16	30
*Burley DO	3	0	3	6
Deep Creek RA	1	0	1	2
Snake River RA	1	0	2	3
Colocation Total	5	0	6	11
*Coeur d'Alene DO	3	0	3	6
Emerald Empire RA	2	0	1	3
Colocation Total	5	0	4	9
Cottonwood RA	1	0	2	3
*Idaho Falls DO	5	0	4	9

BLM NON-MANAGEMENT USERS
BY USER CLASS

TABLE A-2 (Continued)

OFFICES	LANDS & MINERALS USERS	RECORDS USERS	OTHER USERS	TOTAL USERS
Big Butte RA	1	0	1	2
Medicine Lodge RA	1	0	1	2
Colocation Total	7	0	6	13
Pocatello RA	4	0	1	5
*Salmon DO	3	0	4	7
Lemhi RA	2	0	1	3
Challis RA	2	0	1	3
Colocation Total	7	0	6	13
*Shoshone DO	3	0	4	7
Monument RA	1	0	1	2
Bennett Hills RA	1	0	1	2
Colocation Total	5	0	6	11
Montana	152	30	74	256
Montana State Office	63	30	24	117
*Butte DO	8	0	5	13
Headwaters RA	3	0	2	5
Colocation Total	11	0	7	18
Dillon RA	4	0	3	7
Garnet RA	3	0	3	6
Miles City DO	12	0	7	19
*Big Dry RA	7	0	3	10
Powder River RA	6	0	3	9
Colocation Total	13	0	6	19
South Dakota RA	2	0	2	4
Billings RA	3	0	2	5
Dickinson DO	14	0	3	17
*Lewistown DO	13	0	8	21
Judith RA	1	0	1	2
Colocation Total	14	0	9	23
Phillips RA	2	0	2	4
Havre RA	1	0	2	3
Valley RA	1	0	2	3
Great Falls RA	9	0	2	11
Nevada	83	18	70	171
Nevada State Office	35	18	16	69
*Battle Mountain DO	2	0	4	6
Shoshone-Eureka RA	3	0	2	5
Colocation Total	5	0	6	11
Tonopah RA	2	0	1	3
*Carson City DO	3	0	8	11
Lahontan RA	4	0	2	6
Walker RA	2	0	1	3
Colocation Total	9	0	11	20

BLM NON-MANAGEMENT USERS
BY USER CLASS

TABLE A-2 (Continued)

OFFICES	LANDS & MINERALS USERS	RECORDS USERS	OTHER USERS	TOTAL USERS
*Elko DO	4	0	6	10
Elko RA	3	0	3	6
Wells RA	2	0	2	4
Colocation Total	9	0	11	20
*Ely DO	1	0	3	4
Egan RA	4	0	2	6
Schell RA	2	0	2	4
Colocation Total	7	0	7	14
Las Vegas DO	5	0	5	10
Stateline-Esmeralda RA	4	0	3	7
Caliente RA	1	0	2	3
*Winnemucca DO	2	0	4	6
Paradise-Denio RA	2	0	2	4
Sonoma-Gerlach RA	2	0	2	4
Colocation Total	6	0	8	14
New Mexico	252	18	99	369
New Mexico State Office	73	18	28	119
Albuquerque DO	24	0	10	34
Rio Peuerco RA	4	0	7	11
Farmington RA	40	0	11	51
Taos RA	4	0	2	6
*Las Cruces DO	4	0	7	11
Las Cruces/Lordsburg RA	3	0	3	6
White Sands RA	3	0	5	8
Colocation Total	10	0	15	25
Socorro RA	7	0	4	11
Tulsa DO	15	0	3	18
Oklahoma RA	15	0	1	16
Roswell DO	25	0	6	31
Roswell RA	21	0	8	29
Carlsbad RA	14	0	4	18
Oregon	113	12	219	344
Oregon State Office	41	12	34	87
*Burns DO	2	0	8	10
Three Rivers RA	0	0	2	2
Andrews RA	2	0	1	3
Colocation Total	4	0	11	15
*Coos Bay DO	5	0	12	17
Myrtlewood RA	1	0	4	5
Tioga RA	1	0	4	5
Umpqua RA	1	0	3	4
Colocation Total	8	0	23	31
*Eugene DO	5	0	14	19

BLM NON-MANAGEMENT USERS
BY USER CLASS

TABLE A-2 (Continued)

OFFICES	LANDS & MINERALS USERS	RECORDS USERS	OTHER USERS	TOTAL USERS
Noti RA	1	0	3	4
Dorena RA	1	0	3	4
Mohawk RA	1	0	3	4
Colocation Total	8	0	23	31
Lorane RA	1	0	3	4
*Lakeview DO	2	0	3	5
Warner Lake RA	1	0	1	2
High Desert RA	1	0	0	1
Colocation Total	4	0	4	8
Klamath Falls RA	1	0	1	2
*Medford DO	6	0	17	23
Klamath RA	1	0	5	6
Butte Falls RA	1	0	4	5
Jacksonville RA	1	0	5	6
Grants Pass RA	1	0	5	6
Glendale RA	1	0	5	6
Colocation Total	11	0	41	52
*Prineville DO	2	0	4	6
Central Oregon RA	1	0	1	2
Deschutes RA	2	0	1	3
Colocation Total	5	0	6	11
*Roseburg DO	4	0	13	17
North Umpqua RA	1	0	4	5
South Umpqua RA	1	0	3	4
Dillard RA	1	0	3	4
Drain RA	1	0	3	4
Colocation Total	8	0	26	34
*Salem DO	4	0	16	20
Santiam RA	1	0	3	4
Alsea RA	1	0	3	4
Yamhill RA	1	0	2	3
Clackamas RA	1	0	3	4
Colocation Total	8	0	27	35
Tillamook RA	1	0	3	4
*Spokane DO	3	0	3	6
Border RA	2	0	1	3
Colocation Total	5	0	4	9
Wenatchee RA	1	0	0	1
*Vale DO	2	0	8	10
N. Malheur RA	1	0	1	2
S. Malheur RA	1	0	1	2
Colocation Total	4	0	10	14
Baker RA	3	0	3	6
Utah	136	22	69	227

BLM NON-MANAGEMENT USERS
BY USER CLASS

TABLE A-2 (Continued)

OFFICES	LANDS & MINERALS USERS	RECORDS USERS	OTHER USERS	TOTAL USERS
Utah State Office	54	21	15	90
*Salt Lake DO	4	0	4	8
Bear River RA	4	0	2	6
Pony Express RA	2	0	1	3
Colocation Total	10	0	7	17
Cedar City DO	3	0	6	9
Kanab RA	2	0	3	5
Escalante RA	1	0	1	2
Beaver River RA	2	0	2	4
Richfield DO	3	0	7	10
*Warm Springs RA	2	0	1	3
House Range RA	1	0	1	2
Colocation Total	3	0	2	5
Henry Mountain RA	2	0	1	3
Sevier River RA	3	0	1	4
Moab DO	12	0	6	18
San Juan RA	7	1	2	10
Grand RA	6	0	2	8
*Price River RA	4	0	2	6
San Rafael RA	7	0	3	10
Colocation Total	11	0	5	16
*Vernal DO	5	0	5	10
Diamond Mountain RA	6	0	2	8
Book Cliffs RA	6	0	2	8
Colocation Total	17	0	9	26
Wyoming	297	50	79	426
Wyoming State Office	82	50	23	155
Casper DO	38	0	7	45
Platte River RA	10	0	2	12
Buffalo RA	13	0	2	15
Newcastle RA	17	0	1	18
Rawlins DO	36	0	7	43
*Divide RA	4	0	3	7
Medicine Bow RA	2	0	2	4
Colocation Total	6	0	5	11
Lander RA	11	0	4	15
Rock Springs DO	37	0	9	46
*Big Sandy RA	3	0	2	5
Salt Wells RA	3	0	1	4
Colocation Total	6	0	3	9
Kemmerer RA	4	0	3	7
Pinedale RA	2	0	1	3
*Worland DO	27	0	7	34
Grass Creek RA	3	0	2	5

BLM NON-MANAGEMENT USERS
BY USER CLASS

TABLE A-2 (Continued)

OFFICES	LANDS & MINERALS USERS	RECORDS USERS	OTHER USERS	TOTAL USERS
Washakie RA	2	0	2	4
Colocation Total	32	0	11	43
Cody RA	3	0	1	4
TOTAL	1,782	235	1,009	3,026

BLM NON-MANAGEMENT USERS
BY USER CLASS

TABLE A-2 (Continued)

A.3 BLM Non-Management FTE Users by User Class.

Table A-3 "BLM Non-Management FTE Users by User Class," shows all FTE non-management personnel that use the current system, which includes fractions of a user's time (listed in Columns 4 and 5). Users in those columns do not be use the system full time, i.e., only a fraction of their time is spent using the current system.

The BLM offices are listed in the left column of this table. The State, District, and Area Office sites are listed under each state, using the same techniques used for Table A-1. This data in this table was computed using the data in Table A-2, "BLM Non-Management Users by User Class" by multiplying the number of Other Users by 20 percent. Lands & Minerals users and Records users were considered to be full time users, i.e., 100 percent of their workday is spent using the current system.

OFFICES	LANDS & MINERALS FTE USERS	RECORDS FTE USERS	OTHER FTE USERS	TOTAL FTE USERS
Headquarters	116	5	13.4	134.4
Denver Service Center	15	10	2.0	27.0
Arizona	87	9	11.2	107.2
Arizona State Office	43	9	4.0	56.0
Arizona Strip DO	4	0	0.6	4.6
*Vermillon RA	1	0	0.2	1.2
Shivwits RA	3	0	0.4	3.4
Dixie RA (Utah)	1	0	0.2	1.2
Colocation Total	5	0	0.8	5.8
*Phoenix DO	11	0	1.6	12.6
Lower Gila RA	2	0	0.4	2.4
Phoenix RA	3	0	0.4	3.4
Colocation Total	16	0	2.4	18.4
Kingman RA	6	0	0.8	6.8
*Safford DO	3	0	0.8	3.8
San Simon RA	2	0	0.4	2.4
Gila RA	2	0	0.4	2.4
Colocation Total	7	0	1.6	8.6
*Yuma DO	4	0	0.6	4.6
Yuma RA	1	0	0.2	1.2
Colocation Total	5	0	0.8	5.8
Havasu RA	1	0	0.2	1.2
California	134	22	18.8	174.8
California State Office	48	22	5.6	75.6
Bakersfield DO	23	0	1.6	24.6
Bishop RA	1	0	0.2	1.2
Caliente RA	2	0	0.4	2.4
Folsom RA	3	0	0.6	3.6
Hollister RA	2	0	0.4	2.4
Susanville DO	5	0	2.0	7.0
Eagle Lake RA	2	0	0.4	2.4
Cedarville RA	2	0	0.4	2.4
Alturas RA	2	0	0.4	2.4
*Ukiah DO	6	0	1.0	7.0
Clear Lake RA	3	0	0.2	3.2
Colocation Total	9	0	1.2	10.2
Arcata RA	3	0	0.4	3.4
Redding RA	7	0	0.6	7.6
California Desert DO	11	0	1.8	12.8
El Centro RA	3	0	0.6	3.6
Barstow RA	4	0	0.6	4.6
Indio RA	3	0	0.4	3.4
Needles RA	2	0	0.6	2.6

BLM NON-MANAGEMENT FTE USERS
BY USER CLASS

TABLE A-3

OFFICES	LANDS & MINERALS FTE USERS	RECORDS FTE USERS	OTHER FTE USERS	TOTAL FTE USERS
Ridgecrest RA	2	0	0.6	2.6
Colorado	217	22	17.2	256.2
Colorado State Office	92	22	5.6	119.6
Canon City DO	7	0	1.0	8.0
Northeast RA	5	0	0.2	5.2
San Luis RA	0	0	0.4	0.4
Royal Gorge RA	4	0	0.8	4.8
Craig DO	19	0	1.6	20.6
Kremmling RA	1	0	0.8	1.8
White River RA	23	0	0.8	23.8
Little Snake RA	10	0	0.6	10.6
*Grand Junction DO	14	0	1.4	15.4
Grand Junction RA	12	0	1.2	13.2
Colocation Total	26	0	2.6	28.6
Glenwood Springs RA	4	0	0.6	4.6
*Montrose DO	6	0	1.0	7.0
Uncompahgre Basin RA	7	0	0.4	7.4
Colocation Total	13	0	1.4	14.4
Gunnison Basin RA	2	0	0.2	2.2
San Juan RA	11	0	0.6	11.6
Eastern States	102	5	4.6	111.6
Eastern States Office	55	4	3.6	62.6
Jackson DO	23	0	0.4	23.4
Milwaukee DO	22	0	0.6	22.6
Rolla RA	2	1	0.0	3.0
Idaho	78	12	12.6	102.6
Idaho State Office	30	12	3.2	45.2
*Boise DO	7	0	1.8	8.8
Cascade RA	1	0	0.2	1.2
Owyhee RA	2	0	0.4	2.4
Bruneau RA	1	0	0.4	1.4
Jarbidge RA	3	0	0.4	3.4
Colocation Total	14	0	3.2	17.2
*Burley DO	3	0	0.6	3.6
Deep Creek RA	1	0	0.2	1.2
Snake River RA	1	0	0.4	1.4
Colocation Total	5	0	1.2	6.2
*Coeur d'Alene DO	3	0	0.6	3.6
Emerald Empire RA	2	0	0.2	2.2
Colocation Total	5	0	0.8	5.8
Cottonwood RA	1	0	0.4	1.4
*Idaho Falls DO	5	0	0.8	5.8

BLM NON-MANAGEMENT FTE USERS
BY USER CLASS

TABLE A-3 (Continued)

OFFICES	LANDS & MINERALS FTE USERS	RECORDS FTE USERS	OTHER FTE USERS	TOTAL FTE USERS
Big Butte RA	1	0	0.2	1.2
Medicine Lodge RA	1	0	0.2	1.2
Colocation Total	7	0	1.2	8.2
Pocatello RA	4	0	0.2	4.2
*Salmon DO	3	0	0.8	3.8
Lemhi RA	2	0	0.2	2.2
Challis RA	2	0	0.2	2.2
Colocation Total	7	0	1.2	8.2
*Shoshone DO	3	0	0.8	3.8
Monument RA	1	0	0.2	1.2
Bennett Hills RA	1	0	0.2	1.2
Colocation Total	5	0	1.2	6.2
Montana	152	30	14.8	196.8
Montana State Office	63	30	4.8	97.8
*Butte DO	8	0	1.0	9.0
Headwaters RA	3	0	0.4	3.4
Colocation Total	11	0	1.4	12.4
Dillon RA	4	0	0.6	4.6
Garnet RA	3	0	0.6	3.6
Miles City DO	12	0	1.4	13.4
*Big Dry RA	7	0	0.6	7.6
Powder River RA	6	0	0.6	6.6
Colocation Total	13	0	1.2	14.2
South Dakota RA	2	0	0.4	2.4
Billings RA	3	0	0.4	3.4
Dickinson DO	14	0	0.6	14.6
*Lewistown DO	13	0	1.6	14.6
Judith RA	1	0	0.2	1.2
Colocation Total	14	0	1.8	15.8
Phillips RA	2	0	0.4	2.4
Havre RA	1	0	0.4	1.4
Valley RA	1	0	0.4	1.4
Great Falls RA	9	0	0.4	9.4
Nevada	83	18	14.0	115.0
Nevada State Office	35	18	3.2	56.2
*Battle Mountain DO	2	0	0.8	2.8
Shoshone-Eureka RA	3	0	0.4	3.4
Colocation Total	5	0	1.2	6.2
Tonopah RA	2	0	0.2	2.2
*Carson City DO	3	0	1.6	4.6
Lahontan RA	4	0	0.4	4.4
Walker RA	2	0	0.2	2.2
Colocation Total	9	0	2.2	11.2

BLM NON-MANAGEMENT FTE USERS
BY USER CLASS

TABLE A-3 (Continued)

OFFICES	LANDS & MINERALS FTE USERS	RECORDS FTE USERS	OTHER FTE USERS	TOTAL FTE USERS
*Elko DO	4	0	1.2	5.2
Elko RA	3	0	0.6	3.6
Wells RA	2	0	0.4	2.4
Colocation Total	9	0	2.2	11.2
*Ely DO	1	0	0.6	1.6
Egan RA	4	0	0.4	4.4
Schell RA	2	0	0.4	2.4
Colocation Total	7	0	1.4	8.4
Las Vegas DO	5	0	1.0	6.0
Stateline-Esmeralda RA	4	0	0.6	4.6
Caliente RA	1	0	0.4	1.4
*Winnemucca DO	2	0	0.8	2.8
Paradise-Denio RA	2	0	0.4	2.4
Sonoma-Gerlach RA	2	0	0.4	2.4
Colocation Total	6	0	1.6	7.6
New Mexico	252	18	19.8	289.8
New Mexico State Office	73	18	5.6	96.6
Albuquerque DO	24	0	2.0	26.0
Rio Peuerco RA	4	0	1.4	5.4
Farmington RA	40	0	2.2	42.2
Taos RA	4	0	0.4	4.4
*Las Cruces DO	4	0	1.4	5.4
Las Cruces/Lordsburg RA	3	0	0.6	3.6
White Sands RA	3	0	1.0	4.0
Colocation Total	10	0	3.0	13.0
Socorro RA	7	0	0.8	7.8
Tulsa DO	15	0	0.6	15.6
Oklahoma RA	15	0	0.2	15.2
Roswell DO	25	0	1.2	26.2
Roswell RA	21	0	1.6	22.6
Carlsbad RA	14	0	0.8	14.8
Oregon	113	12	43.8	168.8
Oregon State Office	41	12	6.8	59.8
*Burns DO	2	0	1.6	3.6
Three Rivers RA	0	0	0.4	0.4
Andrews RA	2	0	0.2	2.2
Colocation Total	4	0	2.2	6.2
*Coos Bay DO	5	0	2.4	7.4
Myrtlewood RA	1	0	0.8	1.8
Tioga RA	1	0	0.8	1.8
Umpqua RA	1	0	0.6	1.6
Colocation Total	8	0	4.6	12.6
*Eugene DO	5	0	2.8	7.8

BLM NON-MANAGEMENT FTE USERS
BY USER CLASS

TABLE A-3 (Continued)

OFFICES	LANDS & MINERALS FTE USERS	RECORDS FTE USERS	OTHER FTE USERS	TOTAL FTE USERS
Noti RA	1	0	0.6	1.6
Dorena RA	1	0	0.6	1.6
Mohawk RA	1	0	0.6	1.6
Colocation Total	8	0	4.6	12.6
Lorane RA	1	0	0.6	1.6
*Lakeview DO	2	0	0.6	2.6
Warner Lake RA	1	0	0.2	1.2
High Desert RA	1	0	0.0	1.0
Colocation Total	4	0	0.8	4.8
Klamath Falls RA	1	0	0.2	1.2
*Medford DO	6	0	3.4	9.4
Klamath RA	1	0	1.0	2.0
Butte Falls RA	1	0	0.8	1.8
Jacksonville RA	1	0	1.0	2.0
Grants Pass RA	1	0	1.0	2.0
Glendale RA	1	0	1.0	2.0
Colocation Total	11	0	8.2	19.2
*Prineville DO	2	0	0.8	2.8
Central Oregon RA	1	0	0.2	1.2
Deschutes RA	2	0	0.2	2.2
Colocation Total	5	0	1.2	6.2
*Roseburg DO	4	0	2.6	6.6
North Umpqua RA	1	0	0.8	1.8
South Umpqua RA	1	0	0.6	1.6
Dillard RA	1	0	0.6	1.6
Drain RA	1	0	0.6	1.6
Colocation Total	8	0	5.2	13.2
*Salem DO	4	0	3.2	7.2
Santiam RA	1	0	0.6	1.6
Alsea RA	1	0	0.6	1.6
Yamhill RA	1	0	0.4	1.4
Clackamas RA	1	0	0.6	1.6
Colocation Total	8	0	5.4	13.4
Tillamook RA	1	0	0.6	1.6
*Spokane DO	3	0	0.6	3.6
Border RA	2	0	0.2	2.2
Colocation Total	5	0	0.8	5.8
Wenatchee RA	1	0	0.0	1.0
*Vale DO	2	0	1.6	3.6
N. Malheur RA	1	0	0.2	1.2
S. Malheur RA	1	0	0.2	1.2
Colocation Total	4	0	2.0	6.0
Baker RA	3	0	0.6	3.6
Utah	136	22	13.8	171.8

BLM NON-MANAGEMENT FTE USERS
BY USER CLASS

TABLE A-3 (Continued)

OFFICES	LANDS & MINERALS FTE USERS	RECORDS FTE USERS	OTHER FTE USERS	TOTAL FTE USERS
Utah State Office	54	21	3.0	78.0
*Salt Lake DO	4	0	0.8	4.8
Bear River RA	4	0	0.4	4.4
Pony Express RA	2	0	0.2	2.2
Colocation Total	10	0	1.4	11.4
Cedar City DO	3	0	1.2	4.2
Kanab RA	2	0	0.6	2.6
Escalante RA	1	0	0.2	1.2
Beaver River RA	2	0	0.4	2.4
Richfield DO	3	0	1.4	4.4
*Warm Springs RA	2	0	0.2	2.2
House Range RA	1	0	0.2	1.2
Colocation Total	3	0	0.4	3.4
Henry Mountain RA	2	0	0.2	2.2
Sevier River RA	3	0	0.2	3.2
Moab DO	12	0	1.2	13.2
San Juan RA	7	1	0.4	8.4
Grand RA	6	0	0.4	6.4
*Price River RA	4	0	0.4	4.4
San Rafael RA	7	0	0.6	7.6
Colocation Total	11	0	1.0	12.0
*Vernal DO	5	0	1.0	6.0
Diamond Mountain RA	6	0	0.4	6.4
Book Cliffs RA	6	0	0.4	6.4
Colocation Total	17	0	1.8	18.8
Wyoming	297	50	15.8	362.8
Wyoming State Office	82	50	4.6	136.6
Casper DO	38	0	1.4	39.4
Platte River RA	10	0	0.4	10.4
Buffalo RA	13	0	0.4	13.4
Newcastle RA	17	0	0.2	17.2
Rawlins DO	36	0	1.4	37.4
*Divide RA	4	0	0.6	4.6
Medicine Bow RA	2	0	0.4	2.4
Colocation Total	6	0	1.0	7.0
Lander RA	11	0	0.8	11.8
Rock Springs DO	37	0	1.8	38.8
*Big Sandy RA	3	0	0.4	3.4
Salt Wells RA	3	0	0.2	3.2
Colocation Total	6	0	0.6	6.6
Kemmerer RA	4	0	0.6	4.6
Pinedale RA	2	0	0.2	2.2
*Worland DO	27	0	1.4	28.4
Grass Creek RA	3	0	0.4	3.4

BLM NON-MANAGEMENT FTE USERS
BY USER CLASS

TABLE A-3 (Continued)

OFFICES	LANDS & MINERALS FTE USERS	RECORDS FTE USERS	OTHER FTE USERS	TOTAL FTE USERS
Washakie RA	2	0	0.4	2.4
Colocation Total	32	0	2.2	34.2
Cody RA	3	0	0.2	3.2
TOTAL	1,782	235	201.8	2,218.8

BLM NON-MANAGEMENT FTE USERS
BY USER CLASS

TABLE A-3 (Continued)

A.4 BLM Management Users and FTE Users.

Table A-4, "BLM Management Users and FTE Users," presents the number of actual and full time equivalent BLM management users. The column titled "Actual Number of Management Users" indicates the number of management personnel who actually use the current system. The column titled "FTE" translates the number of actual users into their full-time equivalent, which was computed by multiplying the actual number of management users by 17.8 percent. This was done because DSC estimates that management users use the current system 17.8 percent of their workday.

The BLM offices are listed in the left column of this table. The State, District, and Area Office sites are listed under each state, using the same techniques used for Table A-1.

OFFICES	MANAGEMENT USERS	MANAGEMENT FTE USERS
Headquarters	25	4.45
Denver Service Center	0	0.00
Arizona	17	3.02
Arizona State Office[1]	1	0.18
Arizona Strip DO	2	0.36
*Vermillon RA	1	0.18
Shivwits RA	1	0.18
Dixie RA (Utah)	1	0.18
Colocation Total	3	0.53
*Phoenix DO	2	0.36
Lower Gila RA	1	0.18
Phoenix RA	1	0.18
Colocation Total	4	0.71
Kingman RA	1	0.18
*Safford DO	2	0.36
San Simon RA	1	0.18
Gila RA	1	0.18
Colocation Total	4	0.71
*Yuma DO	2	0.36
Yuma RA	1	0.18
Colocation Total	3	0.53
Havasu RA	1	0.18
California	24	4.27
California State Office[1]	1	0.18
Bakersfield DO	2	0.36
Bishop RA	1	0.18
Caliente RA	1	0.18
Folsom RA	1	0.18
Hollister RA	1	0.18
Susanville DO	2	0.36
Eagle Lake RA	1	0.18
Cedarville RA	1	0.18
Alturas RA	1	0.18
*Ukiah DO	2	0.36
Clear Lake RA	1	0.18
Colocation Total	3	0.53
Arcata RA	1	0.18
Redding RA	1	0.18
California Desert DO	2	0.36
El Centro RA	1	0.18
Barstow RA	1	0.18
Indio RA	1	0.18
Needles RA	1	0.18

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[1] = Two positions exist but only one position counted.

BLM MANAGEMENT USERS AND
FTE USERS

TABLE A-4

OFFICES	MANAGEMENT USERS	MANAGEMENT FTE USERS
Ridgecrest RA	1	0.18
Colorado	19	3.38
Colorado State Office[1]	1	0.18
Canon City DO	2	0.36
Northeast RA	1	0.18
San Luis RA	1	0.18
Royal Gorge RA	1	0.18
Craig DO	1	0.18
Kremmling RA	1	0.18
White River RA	1	0.18
Little Snake RA	1	0.18
*Grand Junction DO	2	0.36
Grand Junction RA	1	0.18
Colocation Total	3	0.53
Glenwood Springs RA	1	0.18
*Montrose DO	2	0.36
Uncompahgre Basin RA	1	0.18
Colocation Total	3	0.53
Gunnison Basin RA	1	0.18
San Juan RA	1	0.18
Eastern States	6	1.07
Eastern States Office[1]	1	0.18
Jackson DO	2	0.36
Milwaukee DO	2	0.36
Rolla RA	1	0.18
Idaho	28	4.98
Idaho State Office[1]	1	0.18
*Boise DO	2	0.36
Cascade RA	1	0.18
Owyhee RA	1	0.18
Bruneau RA	1	0.18
Jarbidge RA	1	0.18
Colocation Total	6	1.07
*Burley DO	2	0.36
Deep Creek RA	1	0.18
Snake River RA	1	0.18
Colocation Total	4	0.71
*Coeur d'Alene DO	2	0.36
Emerald Empire RA	1	0.18
Colocation Total	3	0.53
Cottonwood RA	1	0.18

1 = Two positions exist but only one position counted.

BLM MANAGEMENT USERS AND
FTE USERS

TABLE A-4 (Continued)

OFFICES	MANAGEMENT USERS	MANAGEMENT FTE USERS
*Idaho Falls DO	2	0.36
Big Butte RA	1	0.18
Medicine Lodge RA	1	0.18
Colocation Total	4	0.71
Pocatello RA	1	0.18
*Salmon DO	2	0.36
Lemhi RA	1	0.18
Challis RA	1	0.18
Colocation Total	4	0.71
*Shoshone DO	2	0.36
Monument RA	1	0.18
Bennett Hills RA	1	0.18
Colocation Total	4	0.71
Montana	21	3.74
Montana State Office[1]	1	0.18
*Butte DO	2	0.36
Headwaters RA	1	0.18
Colocation Total	3	0.53
Dillon RA	1	0.18
Garnet RA	1	0.18
Miles City DO	2	0.36
*Big Dry RA	1	0.18
Powder River RA	1	0.18
Colocation Total	2	0.36
South Dakota RA	1	0.18
Billings RA	1	0.18
Dickinson DO	2	0.36
*Lewistown DO	2	0.36
Judith RA	1	0.18
Colocation Total	3	0.53
Phillips RA	1	0.18
Havre RA	1	0.18
Valley RA	1	0.18
Great Falls RA	1	0.18
Nevada	21	3.74
Nevada State Office[1]	1	0.18
*Battle Mountain DO	2	0.36
Shoshone-Eureka RA	1	0.18
Colocation Total	3	0.53
Tonopah RA	1	0.18
*Carson City DO	2	0.36
Lahontan RA	1	0.18

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1 = Two positions exist but only one position counted.

BLM MANAGEMENT USERS AND
FTE USERS

TABLE A-4 (Continued)

OFFICES	MANAGEMENT USERS	MANAGEMENT FTE USERS
Walker RA	1	0.18
Colocation Total	4	0.71
*Elko DO	1	0.18
Elko RA	1	0.18
Wells RA	1	0.18
Colocation Total	3	0.53
*Ely DO	1	0.18
Egan RA	1	0.18
Schell RA	1	0.18
Colocation Total	3	0.53
Las Vegas DO	1	0.18
Stateline-Esmeralda RA	1	0.18
Caliente RA	1	0.18
*Winnemucca DO	1	0.18
Paradise-Denio RA	1	0.18
Sonoma-Gerlach RA	1	0.18
Colocation Total	3	0.53
New Mexico	17	3.02
New Mexico State Office[1]	1	0.18
Albuquerque DO	2	0.36
Rio Peuerco RA	1	0.18
Farmington RA	1	0.18
Taos RA	1	0.18
*Las Cruces DO	2	0.36
Las Cruces/Lordsburg RA	1	0.18
White Sands RA	1	0.18
Colocation Total	4	0.71
Socorro RA	1	0.18
Tulsa DO	1	0.18
Oklahoma RA	1	0.18
Roswell DO	2	0.36
Roswell RA	1	0.18
Carlsbad RA	1	0.18
Oregon	53	9.43
Oregon State Office[1]	1	0.18
*Burns DO	2	0.36
Three Rivers RA	1	0.18
Andrews RA	1	0.18
Colocation Total	4	0.71
*Coos Bay DO	2	0.36
Myrtlewood RA	1	0.18
Tioga RA	1	0.18

1 = Two positions exist but only one position counted.

BLM MANAGEMENT USERS AND
FTE USERS

TABLE A-4 (Continued)

OFFICES	MANAGEMENT USERS	MANAGEMENT FTE USERS
Umpqua RA	1	0.18
Colocation Total	5	0.89
*Eugene DO	2	0.36
Noti RA	1	0.18
Dorena RA	1	0.18
Mohawk RA	1	0.18
Colocation Total	5	0.89
Lorane RA	1	0.18
*Lakeview DO	2	0.36
Warner Lake RA	1	0.18
High Desert RA	1	0.18
Colocation Total	4	0.71
Klamath Falls RA	1	0.18
*Medford DO	2	0.36
Klamath RA	1	0.18
Butte Falls RA	1	0.18
Jacksonville RA	1	0.18
Grants Pass RA	1	0.18
Glendale RA	1	0.18
Colocation Total	7	1.25
*Prineville DO	2	0.36
Central Oregon RA	1	0.18
Deschutes RA	1	0.18
Colocation Total	4	0.71
*Roseburg DO	2	0.36
North Umpqua RA	1	0.18
South Umpqua RA	1	0.18
Dillard RA	1	0.18
Drain RA	1	0.18
Colocation Total	6	1.07
*Salem DO	2	0.36
Santiam RA	1	0.18
Alsea RA	1	0.18
Yamhill RA	1	0.18
Clackamas RA	1	0.18
Colocation Total	6	1.07
Tillamook RA	1	0.18
*Spokane DO	2	0.36
Border RA	1	0.18
Colocation Total	3	0.53
Wenatchee RA	1	0.18
*Vale DO	2	0.36
N. Malheur RA	1	0.18
S. Malheur RA	1	0.18

---

1 = Two positions exist but only one position counted.

BLM MANAGEMENT USERS AND
FTE USERS

TABLE A-4 (Continued)

OFFICES	MANAGEMENT USERS	MANAGEMENT FTE USERS
Colocation Total	4	0.71
Baker RA	1	0.18
Utah	23	4.09
Utah State Office[1]	1	0.18
*Salt Lake DO	1	0.18
Bear River RA	1	0.18
Pony Express RA	1	0.18
Colocation Total	3	0.53
Cedar City DO	2	0.36
Kanab RA	1	0.18
Escalante RA	1	0.18
Beaver River RA	1	0.18
Richfield DO	2	0.36
*Warm Springs RA	1	0.18
House Range RA	1	0.18
Colocation Total	2	0.36
Henry Mountain RA	1	0.18
Sevier River RA	1	0.18
Moab DO	2	0.36
San Juan RA	1	0.18
Grand RA	1	0.18
*Price River RA	1	0.18
San Rafael RA	1	0.18
Colocation Total	2	0.36
*Vernal DO	2	0.36
Diamond Mountain RA	1	0.18
Book Cliffs RA	1	0.18
Colocation Total	4	0.71
Wyoming	22	3.91
Wyoming State Office[1]	1	0.18
Casper DO	2	0.36
Platte River RA	1	0.18
Buffalo RA	1	0.18
Newcastle RA	1	0.18
Rawlins DO	2	0.36
*Divide RA	1	0.18
Medicine Bow RA	1	0.18
Colocation Total	2	0.36
Lander RA	1	0.18
Rock Springs DO	2	0.36
*Big Sandy RA	1	0.18
Salt Wells RA	1	0.18

1 = Two positions exist but only one position counted.

BLM MANAGEMENT USERS AND
FTE USERS

TABLE A-4 (Continued)

OFFICES	MANAGEMENT USERS	MANAGEMENT FTE USERS
Colocation Total	2	0.36
Kemmerer RA	1	0.18
Pinedale RA	1	0.18
*Worland DO	2	0.36
Grass Creek RA	1	0.18
Washakie RA	1	0.18
Colocation Total	4	0.71
Cody RA	1	0.18
TOTAL	276	49.0

---

1 = Two positions exist but only one position counted.

BLM MANAGEMENT USERS AND
FTE USERS

TABLE A-4 (Continued)

A.5 Volume of Input Transactions to the Case Processing Tasks Per Day for 1985.

Table A-5, "Volume of Input Transactions to the Case Processing Tasks Per Day for 1985," shows total input transactions and the number of alphanumeric and graphic transactions of each BLM office. This table presents the estimated volume of input to the Case Processing files of the current system per site per day for 1985.

The BLM offices are listed in the left column of this table. The State, District, and Area Office sites are listed under each state, using the same techniques used for Table A-1.

The column titled "Percentage of Spread" shows the allocation of total input transactions to each state and to offices within that state. The input was allocated by multiplying the national total by the percentage allocated to each state and then multiplying the state totals by the relative percentage allocated to each office in that state. For example, the state of Arizona has 3.74 percent of the total alphanumeric Case Processing input transactions. The state total is computed by multiplying the national total by 3.74 percent. The volumes of transactions in each office within the state are computed by multiplying their percentage by the state total. An example of this is the Arizona State Office, which is 36 percent of the total for Arizona. The data used to compute this column were derived from two documents. The intra-state percentages were extracted from the ALMRS "Future System Document," with minor modifications made to these percentages during meetings between FEDSIM and DSC personnel. They were taken from Table 4-1 of Module 2 of the document. The state percentages were taken from the "ALMRS Requirements Document's" Table 1, "Activity Level Ranking of 11 State Offices," on page 6.

The column titled "Total Transactions" shows the number of transactions of each BLM office. At the state level, the transactions column shows the state total. The column titled "A/N Transactions" shows the number of transactions that produce alphanumeric output by site. The column titled "Graphic Transactions" shows the number of transactions that produce graphic output by site.

The total of alphanumeric and graphic case processing transactions was derived from Table 2, "Case Processing - Input/Output Pages," of the "ALMRS Requirements Document". The totals were then divided by 1.275 (the percent of growth between the years 1985 to 1992), which was done because the original document produced 1992 figures only. The growth percentages were developed during meetings between DSC and FEDSIM personnel. These totals were then distributed to each office to create the two columns "A/N Transactions" and "Graphic Transactions." These columns were then added to produce the "Total Transactions" column.

OFFICE	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	ALPHA-NUMERIC TRANS-ACTIONS	GRAPHIC TRANS-ACTIONS
Headquarters				
Denver Service Center				
Arizona	3.74%	576	532	45
Arizona State Office	36.00%	208	191	16
Arizona Strip DO	3.00%	17	16	1
*Vermillon RA	2.00%	12	11	1
Shivwits RA	2.00%	12	11	1
Dixie RA (Utah)[1]	1.00%	15	14	0
Colocation Total		38	35	2
*Phoenix DO	10.00%	58	53	4
Lower Gila RA	9.00%	52	48	4
Phoenix RA	11.00%	63	58	5
Colocation Total		173	159	13
Kingman RA	11.00%	63	58	5
*Safford DO	3.00%	17	16	1
San Simon RA	4.00%	23	21	2
Gila RA	3.00%	17	16	1
Colocation Total		58	53	4
*Yuma DO	2.00%	12	11	1
Yuma RA	2.00%	12	11	1
Colocation Total		23	21	2
Havasu RA	2.00%	12	11	1
California	5.66%	872	804	68
California State Office	22.00%	192	177	15
Bakersfield DO	7.00%	61	56	5
Bishop RA	4.00%	35	32	3
Caliente RA	5.00%	44	40	3
Folsom RA	5.00%	44	40	3
Hollister RA	3.00%	26	24	2
Susanville DO	4.00%	35	32	3
Eagle Lake RA	1.00%	9	8	1
Cedarville RA	1.00%	9	8	1
Alturas RA	1.00%	9	8	1
*Ukiah DO	9.00%	79	72	6
Clear Lake RA	3.00%	26	24	2
Colocation Total		105	97	8
Arcata RA	3.00%	26	24	2
Redding RA	7.00%	61	56	5
California Desert DO	9.00%	79	72	6
El Centro RA	5.00%	44	40	3
Barstow RA	3.00%	26	24	2
Indio RA	2.00%	17	16	1

---

1 = Colocated in Arizona but included in Utah figures.

VOLUME OF INPUT TRANSACTIONS TO THE CASE PROCESSING TASKS PER DAY FOR 1985

TABLE A-5

OFFICE	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	ALPHA-NUMERIC TRANS-ACTIONS	GRAPHIC TRANS-ACTIONS
Needles RA	2.00%	17	16	1
Ridgecrest RA	4.00%	35	32	3
Colorado	8.11%	1,250	1,153	97
Colorado State Office	24.00%	300	277	23
Canon City DO	5.00%	63	58	5
Northeast RA	3.00%	38	35	3
San Luis RA	3.00%	38	35	3
Royal Gorge RA	4.00%	50	46	4
Craig DO	10.00%	125	115	10
Kremmling RA	2.00%	25	23	2
White River RA	7.00%	88	81	7
Little Snake RA	3.00%	38	35	3
*Grand Junction DO	8.00%	100	92	8
Grand Junction RA	4.00%	50	46	4
Colocation Total		150	138	12
Glenwood Springs RA	4.00%	50	46	4
*Montrose DO	7.00%	88	81	7
Uncompahgre Basin RA	4.00%	50	46	4
Colocation Total		138	127	11
Gunnison Basin RA	4.00%	50	46	4
San Juan RA	8.00%	100	92	8
Eastern States	6.61%	1,019	939	79
Eastern States Office	64.00%	652	601	51
Jackson DO	18.00%	183	169	14
Milwaukee DO	17.00%	173	160	14
Rolla RA	1.00%	10	9	1
Idaho	3.85%	593	547	46
Idaho State Office	35.00%	208	192	16
*Boise DO	9.00%	53	49	4
Cascade RA	2.00%	12	11	1
Owyhee RA	4.00%	24	22	2
Bruneau RA	5.00%	30	27	2
Jarbidge RA	1.00%	6	5	0
Colocation Total		125	115	10
*Burley DO	2.00%	12	11	1
Deep Creek RA	2.00%	12	11	1
Snake River RA	2.00%	12	11	1
Colocation Total		36	33	3
*Coeur d'Alene DO	2.00%	12	11	1
Emerald Empire RA	2.00%	12	11	1
Colocation Total		24	22	2

VOLUME OF INPUT TRANSACTIONS TO THE CASE PROCESSING TASKS PER DAY FOR 1985

TABLE A-5 (Continued)

OFFICE	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	ALPHA-NUMERIC TRANS-ACTIONS	GRAPHIC TRANS-ACTIONS
Cottonwood RA	4.00%	24	22	2
*Idaho Falls DO	6.00%	36	33	3
Big Butte RA	3.00%	18	16	1
Medicine Lodge RA	1.00%	6	5	0
Colocation Total		59	55	5
Pocatello RA	7.00%	42	38	3
*Salmon DO	2.00%	12	11	1
Lemhi RA	2.00%	12	11	1
Challis RA	2.00%	12	11	1
Colocation Total		36	33	3
*Shoshone DO	2.00%	12	11	1
Monument RA	1.00%	6	5	0
Bennett Hills RA	4.00%	24	22	2
Colocation Total		42	38	3
Montana	12.22%	1,884	1,737	147
Montana State Office	27.00%	509	469	40
*Butte DO	6.00%	113	104	9
Headwaters RA	2.00%	38	35	3
Colocation Total		151	139	12
Dillon RA	4.00%	75	69	6
Garnet RA	4.00%	75	69	6
Miles City DO	10.00%	188	174	15
*Big Dry RA	4.00%	75	69	6
Powder River RA	4.00%	75	69	6
Colocation Total		151	139	12
South Dakota RA	1.00%	19	17	1
Billings RA	5.00%	94	87	7
Dickinson DO	4.00%	170	156	13
*Lewistown DO	8.00%	151	139	12
Judith RA	3.00%	57	52	4
Colocation Total		207	191	16
Phillips RA	5.00%	94	87	7
Havre RA	1.00%	19	17	1
Valley RA	1.00%	19	17	1
Great Falls RA	6.00%	113	104	9
Nevada	7.92%	1,221	1,126	95
Nevada State Office	27.00%	330	304	26
*Battle Mountain DO	4.00%	49	45	4
Shoshone-Eureka RA	2.00%	24	23	2
Colocation Total		73	68	6
Tonopah RA	5.00%	61	56	5
*Carson City DO	5.00%	61	56	5

VOLUME OF INPUT TRANSACTIONS TO THE CASE PROCESSING TASKS PER DAY FOR 1985

TABLE A-5 (Continued)

OFFICE	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	ALPHA-NUMERIC TRANS-ACTIONS	GRAPHIC TRANS-ACTIONS
Lahontan RA	5.00%	61	56	5
Walker RA	2.00%	24	23	2
Colocation Total		146	135	11
*Elko DO	3.00%	37	34	3
Elko RA	2.00%	24	23	2
Wells RA	2.00%	24	23	2
Colocation Total		85	79	7
*Ely DO	3.00%	37	34	3
Egan RA	2.00%	24	23	2
Schell RA	2.00%	24	23	2
Colocation Total		85	79	7
Las Vegas DO	12.00%	146	135	11
Stateline-Esmeralda RA	3.00%	37	34	3
Caliente RA	12.00%	146	135	11
*Winnemucca DO	2.00%	24	23	2
Paradise-Denio RA	2.00%	24	23	2
Sonoma-Gerlach RA	5.00%	61	56	5
Colocation Total		110	101	9
New Mexico	15.18%	2,340	2,157	182
New Mexico State Office	27.00%	632	582	49
Albuquerque DO	14.00%	328	302	26
Rio Peuerco RA	6.00%	140	129	11
Farmington RA	11.00%	257	237	20
Taos RA	2.00%	47	43	4
*Las Cruces DO	5.00%	117	108	9
Las Cruces/Lordsburg RA	3.00%	70	65	5
White Sands RA	1.00%	23	22	2
Colocation Total		211	194	16
Socorro RA	2.00%	47	43	4
Tulsa DO	3.00%	70	65	5
Oklahoma RA	4.00%	94	86	7
Roswell DO	11.00%	257	237	20
Roswell RA	6.00%	140	129	11
Carlsbad RA	5.00%	117	108	9
Oregon	5.89%	908	837	71
Oregon State Office	32.00%	291	268	23
*Burns DO	4.00%	36	33	3
Three Rivers RA	1.00%	9	8	1
Andrews RA	1.00%	9	8	1
Colocation Total		54	50	4
*Coos Bay DO	1.00%	9	8	1
Myrtlewood RA	1.00%	9	8	1

VOLUME OF INPUT TRANSACTIONS TO THE CASE
PROCESSING TASKS PER DAY FOR 1985

TABLE A-5 (Continued)

OFFICE	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	ALPHA-NUMERIC TRANS-ACTIONS	GRAPHIC TRANS-ACTIONS
Tioga RA	1.00%	9	8	1
Umpqua RA	1.00%	9	8	1
Colocation Total		36	33	3
*Eugene DO	1.00%	9	8	1
Noti RA	1.00%	9	8	1
Dorena RA	1.00%	9	8	1
Mohawk RA	1.00%	9	8	1
Colocation Total		36	33	3
Lorane RA	1.00%	9	8	1
*Lakeview DO	4.00%	36	33	3
Warner Lake RA	1.00%	9	8	1
High Desert RA	1.00%	9	8	1
Colocation Total		54	50	4
Klamath Falls RA	1.00%	9	8	1
*Medford DO	6.00%	54	50	4
Klamath RA	1.00%	9	8	1
Butte Falls RA	1.00%	9	8	1
Jacksonville RA	1.00%	9	8	1
Grants Pass RA	1.00%	9	8	1
Glendale RA	1.00%	9	8	1
Colocation Total		100	92	8
*Prineville DO	5.00%	45	42	4
Central Oregon RA	1.00%	9	8	1
Deschutes RA	1.00%	9	8	1
Colocation Total		64	59	5
*Roseburg DO	1.00%	9	8	1
North Umpqua RA	1.00%	9	8	1
South Umpqua RA	1.00%	9	8	1
Dillard RA	1.00%	9	8	1
Drain RA	1.00%	9	8	1
Colocation Total		45	42	4
*Salem DO	2.00%	18	17	1
Santiam RA	1.00%	9	8	1
Alsea RA	1.00%	9	8	1
Yamhill RA	1.00%	9	8	1
Clackamas RA	1.00%	9	8	1
Colocation Total		54	50	4
Tillamook RA	1.00%	9	8	1
*Spokane DO	6.00%	54	50	4
Border RA	1.00%	9	8	1
Colocation Total		64	59	5
Wenatchee RA	1.00%	9	8	1
*Vale DO	5.00%	45	42	4
N. Malheur RA	1.00%	9	8	1

VOLUME OF INPUT TRANSACTIONS TO THE CASE
PROCESSING TASKS PER DAY FOR 1985

TABLE A-5 (Continued)

OFFICE	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	ALPHA-NUMERIC TRANS-ACTIONS	GRAPHIC TRANS-ACTIONS
S. Malheur RA	1.00%	9	8	1
Colocation Total		64	59	5
Baker RA	1.00%	9	8	1
Utah	9.88%	1,523	1,404	119
Utah State Office	27.00%	411	379	32
*Salt Lake DO	3.00%	46	42	4
Bear River RA	3.00%	46	42	4
Pony Express RA	1.00%	15	14	1
Colocation Total		107	98	8
Cedar City DO	4.00%	61	56	5
Kanab RA	3.00%	46	42	4
Escalante RA	1.00%	15	14	1
Beaver River RA	3.00%	46	42	4
Richfield DO	5.00%	76	70	6
*Warm Springs RA	2.00%	30	28	2
House Range RA	1.00%	15	14	1
Colocation Total		46	42	4
Henry Mountain RA	1.00%	15	14	1
Sevier River RA	2.00%	30	28	2
Moab DO	9.00%	137	126	11
San Juan RA	6.00%	91	84	7
Grand RA	5.00%	76	70	6
*Price River RA	3.00%	46	42	4
San Rafael RA	6.00%	91	84	7
Colocation Total		137	126	11
*Vernal DO	6.00%	91	84	7
Diamond Mountain RA	4.00%	61	56	5
Book Cliffs RA	4.00%	61	56	5
Colocation Total		213	197	17
Wyoming	20.94%	3,228	2,976	252
Wyoming State Office	23.00%	742	684	58
Casper DO	14.00%	452	417	35
Platte River RA	4.00%	129	119	10
Buffalo RA	4.00%	129	119	10
Newcastle RA	5.00%	161	149	13
Rawlins DO	10.00%	323	298	25
*Divide RA	3.00%	97	89	8
Medicine Bow RA	2.00%	65	60	5
Colocation Total		161	149	13
Lander RA	3.00%	97	89	8
Rock Springs DO	10.00%	323	298	25
*Big Sandy RA	2.00%	65	60	5

VOLUME OF INPUT TRANSACTIONS TO THE CASE
PROCESSING TASKS PER DAY FOR 1985

TABLE A-5 (Continued)

OFFICE	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	ALPHA-NUMERIC TRANS-ACTIONS	GRAPHIC TRANS-ACTIONS
Salt Wells RA	4.00%	129	119	10
Colocation Total		194	179	15
Kemmerer RA	4.00%	129	119	10
Pinedale RA	2.00%	65	60	5
*Worland DO	6.00%	194	179	15
Grass Creek RA	1.00%	32	30	3
Washakie RA	1.00%	32	30	3
Colocation Total		258	238	20
Cody RA	2.00%	65	60	5
TOTAL		15,413	14,212	1,202

VOLUME OF INPUT TRANSACTIONS TO THE CASE
PROCESSING TASKS PER DAY FOR 1985

TABLE A-5 (Continued)

A.6 Volume of Input Transactions to the Management Reporting Tasks Per Day for 1985.

Table A-6, "Volume of Input Transactions to the Management Reporting Tasks Per Day for 1985," shows the volume of input to the Management Reporting tasks for each BLM office, per day in 1985.

The BLM offices are listed in the left column of this table. The State, District, and Area Office sites are listed under each state, using the same techniques used for Table A-1.

The column titled "Percentage of Spread" shows the allocation of the input transactions to each state and to offices within that state. The same techniques and sources of information used to produce Table A-5 were used to produce Table A-6.

The total number of Management Reporting input transactions was derived from Algorithm 9, "Modules of Work Management Reporting and Statistics," of the "ALMRS Requirements Document." The number of transactions for BLM Headquarters and DSC was derived from the same source and subtracted from the total before the transactions were allocated to the states.

OFFICE	PERCENTAGE SPREAD	ALPHANUMERIC TRANSACTIONS
Headquarters		1,200
Denver Service Center		120
Arizona	3.74%	175
Arizona State Office	36.00%	63
Arizona Strip DO	3.00%	5
*Vermillon RA	2.00%	4
Shivwits RA	2.00%	4
Dixie RA (Utah)[1]	1.00%	5
Colocation Total		12
*Phoenix DO	10.00%	18
Lower Gila RA	9.00%	16
Phoenix RA	11.00%	19
Colocation Total		53
Kingman RA	11.00%	19
*Safford DO	3.00%	5
San Simon RA	4.00%	7
Gila RA	3.00%	5
Colocation Total		18
*Yuma DO	2.00%	4
Yuma RA	2.00%	4
Colocation Total		7
Havasu RA	2.00%	4
California	5.66%	265
California State Office	22.00%	58
Bakersfield DO	7.00%	19
Bishop RA	4.00%	11
Caliente RA	5.00%	13
Folsom RA	5.00%	13
Hollister RA	3.00%	8
Susanville DO	4.00%	11
Eagle Lake RA	1.00%	3
Cedarville RA	1.00%	3
Alturas RA	1.00%	3
*Ukiah DO	9.00%	24
Clear Lake RA	3.00%	8
Colocation Total		32
Arcata RA	3.00%	8
Redding RA	7.00%	19
California Desert DO	9.00%	24
El Centro RA	5.00%	13
Barstow RA	3.00%	8
Indio RA	2.00%	5
Needles RA	2.00%	5
Ridgecrest RA	4.00%	11

1 = Colocated in Arizona but included in Utah figures.

VOLUME OF INPUT TRANSACTIONS TO THE MANAGEMENT
REPORTING TASKS PER DAY FOR 1985

TABLE A-6

OFFICE	PERCENTAGE SPREAD	ALPHANUMERIC TRANSACTIONS
Colorado	8.11%	380
Colorado State Office	24.00%	91
Canon City DO	5.00%	19
Northeast RA	3.00%	11
San Luis RA	3.00%	11
Royal Gorge RA	4.00%	15
Craig DO	10.00%	38
Kremmling RA	2.00%	8
White River RA	7.00%	27
Little Snake RA	3.00%	11
*Grand Junction DO	8.00%	30
Grand Junction RA	4.00%	15
Colocation Total		46
Glenwood Springs RA	4.00%	15
*Montrose DO	7.00%	27
Uncompahgre Basin RA	4.00%	15
Colocation Total		42
Gunnison Basin RA	4.00%	15
San Juan RA	8.00%	30
Eastern States	6.61%	309
Eastern States Office	64.00%	198
Jackson DO	18.00%	56
Milwaukee DO	17.00%	53
Rolla RA	1.00%	3
Idaho	3.85%	180
Idaho State Office	35.00%	63
*Boise DO	9.00%	16
Cascade RA	2.00%	4
Owyhee RA	4.00%	7
Bruneau RA	5.00%	9
Jarbidge RA	1.00%	2
Colocation Total		38
*Burley DO	2.00%	4
Deep Creek RA	2.00%	4
Snake River RA	2.00%	4
Colocation Total		11
*Coeur d'Alene DO	2.00%	4
Emerald Empire RA	2.00%	4
Colocation Total		7
Cottonwood RA	4.00%	7
*Idaho Falls DO	6.00%	11
Big Butte RA	3.00%	5
Medicine Lodge RA	1.00%	2

VOLUME OF INPUT TRANSACTIONS TO THE MANAGEMENT
REPORTING TASKS PER DAY FOR 1985

TABLE A-6 (Continued)

OFFICE	PERCENTAGE SPREAD	ALPHANUMERIC TRANSACTIONS
Colocation Total		18
Pocatello RA	7.00%	13
*Salmon DO	2.00%	4
Lemhi RA	2.00%	4
Challis RA	2.00%	4
Colocation Total		11
*Shoshone DO	2.00%	4
Monument RA	1.00%	2
Bennett Hills RA	4.00%	7
Colocation Total		13
Montana	12.22%	572
Montana State Office	27.00%	154
*Butte DO	6.00%	34
Headwaters RA	2.00%	11
Colocation Total		46
Dillon RA	4.00%	23
Garnet RA	4.00%	23
Miles City DO	10.00%	57
*Big Dry RA	4.00%	23
Powder River RA	4.00%	23
Colocation Total		46
South Dakota RA	1.00%	6
Billings RA	5.00%	29
Dickinson DO	9.00%	51
*Lewistown DO	8.00%	46
Judith RA	3.00%	17
Colocation Total		51
Phillips RA	5.00%	29
Havre RA	1.00%	6
Valley RA	1.00%	6
Great Falls RA	6.00%	34
Nevada	7.92%	371
Nevada State Office	27.00%	100
*Battle Mountain DO	4.00%	15
Shoshone-Eureka RA	2.00%	7
Colocation Total		22
Tonopah RA	5.00%	19
*Carson City DO	5.00%	19
Lahontan RA	5.00%	19
Walker RA	2.00%	7
Colocation Total		44
*Elko DO	3.00%	11
Elko RA	2.00%	7
Wells RA	2.00%	7

VOLUME OF INPUT TRANSACTIONS TO THE MANAGEMENT
REPORTING TASKS PER DAY FOR 1985

TABLE A-6 (Continued)

OFFICE	PERCENTAGE SPREAD	ALPHANUMERIC TRANSACTIONS
Colocation Total		26
*Ely DO	3.00%	11
Egan RA	2.00%	7
Schell RA	2.00%	7
Colocation Total		26
Las Vegas DO	12.00%	44
Stateline-Esmeralda RA	3.00%	11
Caliente RA	12.00%	44
*Winnemucca DO	2.00%	7
Paradise-Denio RA	2.00%	7
Sonoma-Gerlach RA	5.00%	19
Colocation Total		33
New Mexico	15.18%	710
New Mexico State Office	27.00%	192
Albuquerque DO	14.00%	99
Rio Peuerco RA	6.00%	43
Farmington RA	11.00%	78
Taos RA	2.00%	14
*Las Cruces DO	5.00%	36
Las Cruces/Lordsburg RA	3.00%	21
White Sands RA	1.00%	7
Colocation Total		64
Socorro RA	2.00%	14
Tulsa DO	3.00%	21
Oklahoma RA	4.00%	28
Roswell DO	11.00%	78
Roswell RA	6.00%	43
Carlsbad RA	5.00%	36
Oregon	5.89%	276
Oregon State Office	32.00%	88
*Burns DO	4.00%	11
Three Rivers RA	1.00%	3
Andrews RA	1.00%	3
Colocation Total		17
*Coos Bay DO	1.00%	3
Myrtlewood RA	1.00%	3
Tioga RA	1.00%	3
Umpqua RA	1.00%	3
Colocation Total		11
*Eugene DO	1.00%	3
Noti RA	1.00%	3
Dorena RA	1.00%	3
Mohawk RA	1.00%	3
Colocation Total		11

VOLUME OF INPUT TRANSACTIONS TO THE MANAGEMENT
REPORTING TASKS PER DAY FOR 1985

TABLE A-6 (Continued)

OFFICE	PERCENTAGE SPREAD	ALPHANUMERIC TRANSACTIONS
Lorane RA	1.00%	3
*Lakeview DO	4.00%	11
Warner Lake RA	1.00%	3
High Desert RA	1.00%	3
Colocation Total		17
Klamath Falls RA	1.00%	3
*Medford DO	6.00%	17
Klamath RA	1.00%	3
Butte Falls RA	1.00%	3
Jacksonville RA	1.00%	3
Grants Pass RA	1.00%	3
Glendale RA	1.00%	3
Colocation Total		30
*Prineville DO	5.00%	14
Central Oregon RA	1.00%	3
Deschutes RA	1.00%	3
Colocation Total		19
*Roseburg DO	1.00%	3
North Umpqua RA	1.00%	3
South Umpqua RA	1.00%	3
Dillard RA	1.00%	3
Drain RA	1.00%	3
Colocation Total		14
*Salem DO	2.00%	6
Santiam RA	1.00%	3
Alsea RA	1.00%	3
Yamhill RA	1.00%	3
Clackamas RA	1.00%	3
Colocation Total		17
Tillamook RA	1.00%	3
*Spokane DO	6.00%	17
Border RA	1.00%	3
Colocation Total		19
Wenatchee RA	1.00%	3
*Vale DO	5.00%	14
N. Malheur RA	1.00%	3
S. Malheur RA	1.00%	3
Colocation Total		19
Baker RA	1.00%	3
Utah	9.88%	462
Utah State Office	27.00%	125
*Salt Lake DO	3.00%	14
Bear River RA	3.00%	14
Pony Express RA	1.00%	5
Colocation Total		23

VOLUME OF INPUT TRANSACTIONS TO THE MANAGEMENT
REPORTING TASKS PER DAY FOR 1985

TABLE A-6 (Continued)

OFFICE	PERCENTAGE SPREAD	ALPHANUMERIC TRANSACTIONS
Cedar City DO	4.00%	18
Kanab RA	3.00%	14
Escalante RA	1.00%	5
Beaver River RA	3.00%	14
Richfield DO	5.00%	23
*Warm Springs RA	2.00%	9
House Range RA	1.00%	5
Colocation Total		14
Henry Mountain RA	1.00%	5
Sevier River RA	2.00%	9
Moab DO	9.00%	42
San Juan RA	6.00%	28
Grand RA	5.00%	23
*Price River RA	3.00%	14
San Rafael RA	6.00%	28
Colocation Total		42
*Vernal DO	6.00%	28
Diamond Mountain RA	4.00%	18
Book Cliffs RA	4.00%	18
Colocation Total		65
Wyoming	20.64%	966
Wyoming State Office	23.00%	222
Casper DO	14.00%	135
Platte River RA	4.00%	39
Buffalo RA	4.00%	39
Newcastle RA	5.00%	48
Rawlins DO	10.00%	97
*Divide RA	3.00%	29
Medicine Bow RA	2.00%	19
Colocation Total		48
Lander RA	3.00%	29
Rock Springs DO	10.00%	97
*Big Sandy RA	2.00%	19
Salt Wells RA	4.00%	39
Colocation Total		58
Kemmerer RA	4.00%	39
Pinedale RA	2.00%	19
*Worland DO	6.00%	58
Grass Creek RA	1.00%	10
Washakie RA	1.00%	10
Colocation Total		77
Cody RA	2.00%	19
TOTAL		6000

VOLUME OF INPUT TRANSACTIONS TO THE MANAGEMENT REPORTING TASKS PER DAY FOR 1985

TABLE A-6 (Continued)

A.7 Volume of Input Transactions to the Query Tasks for Alphanumeric Output Per Day for 1985.

Table A-7, "Volume of Input Transactions to the Query Tasks for Alphanumeric Output Per Day for 1985," shows the volume of input to the Query tasks for each BLM office, per day in 1985. It shows the total transactions of each office and divides the total into either internal or public transactions. External transactions (transactions for agencies that are external to BLM) are shown on the row titled "Denver Service Center-Ext."

The BLM offices are listed in the left column of this table. The State, District, and Area Office sites are listed under each state, using the same techniques used for Table A-1.

The column titled "Percentage of Spread" shows the allocation of the input transactions to each state and to offices within that state, as explained for Table A-5.

The total number of Alphanumeric Query transactions was derived from Algorithm 8, "Module of Work Query (for Alphanumeric)," of the "ALMRS Requirements Document". This total was multiplied by 80 percent to produce the estimated volumes of internal and public query workload. The remaining 20 percent represents the external user workload, which is shown as "Denver Service Center-Ext." These estimates were confirmed during meetings between DSC and FEDSIM personnel.

The totals were then divided by 1.275 percent, which is the growth estimated to occur from 1985 to 1992. This was done to estimate the 1985 workload because the original document produced 1992 estimates only. The growth percentages were developed during meetings between DSC and FEDSIM personnel.

This total was then allocated to BLM offices to produce the "Total Transactions" column. This column was further divided into "Internal Transactions" and "Public Transactions." At the State and District Offices, the internal and public columns are estimated to have 50 percent volume of the total each. At the Area Offices, 75 percent of the transactions are by internal users and 25 percent are by public users. These percentages were developed and confirmed at meetings between DSC and FEDSIM personnel.

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Headquarters	0.10%	71	71	
Denver Service Center	0.20%	142	142	
Denver Service Center-Ext		17,757		
Arizona	3.74%	2,656		
Arizona State Office	36.00%	956	478	478
Arizona Strip DO	3.00%	80	40	40
Vermillon RA	2.00%	53	40	13
Shivwits RA	2.00%	53	40	13
Dixie RA (Utah)[1]	1.00%	70	53	18
Colocation Total		176	132	44
*Phoenix DO	10.00%	266	133	133
Lower Gila RA	9.00%	239	179	60
Phoenix RA	11.00%	292	219	73
Colocation Total		797	531	266
Kingman RA	11.00%	292	219	73
*Safford DO	3.00%	80	40	40
San Simon RA	4.00%	106	80	27
Gila RA	3.00%	80	60	20
Colocation Total		266	179	86
*Yuma DO	2.00%	53	27	27
Yuma RA	2.00%	53	40	13
Colocation Total		106	66	40
Havasu RA	2.00%	53	40	13
Arizona Subtotal		2,727	1,686	1,040
California	5.66%	4,020		
California State Office	22.00%	884	442	442
Bakersfield DO	7.00%	281	141	141
Bishop RA	4.00%	161	121	40
Caliente RA	5.00%	201	151	50
Folsom RA	5.00%	201	151	50
Hollister RA	3.00%	121	90	30
Susanville DO	4.00%	161	80	80
Eagle Lake RA	1.00%	40	30	10
Cedarville RA	1.00%	40	30	10
Alturas RA	1.00%	40	30	10
*Ukiah DO	9.00%	362	181	181
Clear Lake RA	3.00%	121	90	30
Colocation Total		482	271	211
Arcata RA	3.00%	121	90	30
Redding RA	7.00%	281	211	70
California Desert DO	9.00%	362	181	181
El Centro RA	5.00%	201	151	50

1 = Colocated in Arizona but included in Utah figures.

VOLUME OF INPUT TRANSACTIONS TO THE QUERY TASKS
FOR ALPHANUMERIC OUTPUT PER DAY FOR 1985

TABLE A-7

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Barstow RA	3.00%	121	90	30
Indio RA	2.00%	80	60	20
Needles RA	2.00%	80	60	20
Ridgecrest RA	4.00%	161	121	40
California Subtotal		4,020	2,503	1,518
Colorado	8.11%	5,760		
Colorado State Office	24.00%	1,382	691	691
Canon City DO	5.00%	288	144	144
Northeast RA	3.00%	173	130	43
San Luis RA	3.00%	173	130	43
Royal Gorge RA	4.00%	230	173	58
Craig DO	10.00%	576	288	288
Kremmling RA	2.00%	115	86	29
White River RA	7.00%	403	302	101
Little Snake RA	3.00%	173	130	43
*Grand Junction DO	8.00%	461	230	230
Grand Junction RA	4.00%	230	173	58
Colocation Total		691	403	288
Glenwood Springs RA	4.00%	230	173	58
*Montrose DO	7.00%	403	202	202
Uncompahgre Basin RA	4.00%	230	173	58
Colocation Total		634	374	259
Gunnison Basin RA	4.00%	230	173	58
San Juan RA	8.00%	461	346	115
Colorado Subtotal		5,760	3,543	2,218
Eastern States	6.61%	4,695		
Eastern States Office	64.00%	3,005	1,502	1,502
Jackson DO	18.00%	845	423	423
Milwaukee DO	17.00%	798	399	399
Rolla RA	1.00%	47	35	12
Eastern States Subtotal		4,695	2,359	2,336
Idaho	3.85%	2,735		
Idaho State Office	35.00%	957	479	479
*Boise DO	9.00%	246	123	123
Cascade RA	2.00%	55	41	14
Owyhee RA	4.00%	109	82	27
Bruneau RA	5.00%	137	103	34
Jarbidge RA	1.00%	27	21	7
Colocation Total		574	369	205

VOLUME OF INPUT TRANSACTIONS TO THE QUERY TASKS
FOR ALPHANUMERIC OUTPUT PER DAY FOR 1985

TABLE A-7 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
*Burley DO	2.00%	55	27	27
Deep Creek RA	2.00%	55	41	14
Snake River RA	2.00%	55	41	14
Colocation Total		164	109	55
*Coeur d'Alene DO	2.00%	55	27	27
Emerald Empire RA	2.00%	55	41	14
Colocation Total		109	68	41
Cottonwood RA	4.00%	109	82	27
*Idaho Falls DO	6.00%	164	82	82
Big Butte RA	3.00%	82	62	21
Medicine Lodge RA	1.00%	27	21	7
Colocation Total		273	164	109
Pocatello RA	7.00%	191	144	48
*Salmon DO	2.00%	55	27	27
Lemhi RA	2.00%	55	41	14
Challis RA	2.00%	55	41	14
Colocation Total		164	109	55
*Shoshone DO	2.00%	55	27	27
Monument RA	1.00%	27	21	7
Bennett Hills RA	4.00%	109	82	27
Colocation Total		191	130	62
Idaho Subtotal		2,735	1,654	1,080
Montana	12.22%	8,680		
Montana State Office	27.00%	2,343	1,172	1,172
*Butte DO	6.00%	521	260	260
Headwaters RA	2.00%	174	130	43
Colocation Total		694	391	304
Dillon RA	4.00%	347	260	87
Garnet RA	4.00%	347	260	87
Miles City DO	10.00%	868	434	434
*Big Dry RA	4.00%	347	260	87
Powder River RA	4.00%	347	260	87
Colocation Total		694	521	174
South Dakota RA	1.00%	87	65	22
Billings RA	5.00%	434	325	108
Dickinson DO	9.00%	781	391	391
*Lewistown DO	8.00%	694	347	347
Judith RA	3.00%	260	195	65
Colocation Total		955	542	412
Phillips RA	5.00%	434	325	108
Havre RA	1.00%	87	65	22
Valley RA	1.00%	87	65	22
Great Falls RA	6.00%	521	391	130

VOLUME OF INPUT TRANSACTIONS TO THE QUERY TASKS
FOR ALPHANUMERIC OUTPUT PER DAY FOR 1985

TABLE A-7 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Montana Subtotal		8,680	5,208	3,472
Nevada	7.92%	5,625		
Nevada State Office	27.00%	1,519	759	759
*Battle Mountain DO	4.00%	225	113	113
Shoshone-Eureka RA	2.00%	113	84	28
Colocation Total		338	197	141
Tonopah RA	5.00%	281	211	70
*Carson City DO	5.00%	281	141	141
Lahontan RA	5.00%	281	211	70
Walker RA	2.00%	113	84	28
Colocation Total		675	436	239
*Elko DO	3.00%	169	84	84
Elko RA	2.00%	113	84	28
Wells RA	2.00%	113	84	28
Colocation Total		394	253	141
*Ely DO	3.00%	169	84	84
Egan RA	2.00%	113	84	28
Schell RA	2.00%	113	84	28
Colocation Total		394	253	141
Las Vegas DO	12.00%	675	338	338
Stateline-Esmeralda RA	3.00%	169	127	42
Caliente RA	12.00%	675	506	169
*Winnemucca DO	2.00%	113	56	56
Paradise-Denio RA	2.00%	113	84	28
Sonoma-Gerlach RA	5.00%	281	211	70
Colocation Total		506	352	155
Nevada Subtotal		5,625	3,431	2,194
New Mexico	15.18%	10,782		
New Mexico State Office	27.00%	2,911	1,456	1,456
Albuquerque DO	14.00%	1,509	755	755
Rio Peuerco RA	6.00%	647	485	162
Farmington RA	11.00%	1,186	890	297
Taos RA	2.00%	216	162	54
*Las Cruces DO	5.00%	539	270	270
Las Cruces/Lordsburg RA	3.00%	323	243	81
White Sands RA	1.00%	108	81	27
Colocation Total		970	593	377
Socorro RA	2.00%	216	162	54
Tulsa DO	3.00%	323	162	162
Oklahoma RA	4.00%	431	323	108
Roswell DO	11.00%	1,186	593	593

VOLUME OF INPUT TRANSACTIONS TO THE QUERY TASKS
FOR ALPHANUMERIC OUTPUT PER DAY FOR 1985

TABLE A-7 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Roswell RA	6.00%	647	485	162
Carlsbad RA	5.00%	539	404	135
New Mexico Subtotal		10,782	6,631	4,151
Oregon	5.89%	4,184		
Oregon State Office	32.00%	1,339	669	669
*Burns DO	4.00%	167	84	84
Three Rivers RA	1.00%	42	31	10
Andrews RA	1.00%	42	31	10
Colocation Total		251	146	105
*Coos Bay DO	1.00%	42	21	21
Myrtlewood RA	1.00%	42	31	10
Tioga RA	1.00%	42	31	10
Umpqua RA	1.00%	42	31	10
Colocation Total		167	115	52
*Eugene DO	1.00%	42	21	21
Noti RA	1.00%	42	31	10
Dorena RA	1.00%	42	31	10
Mohawk RA	1.00%	42	31	10
Colocation Total		167	115	52
Lorane RA	1.00%	42	31	10
*Lakeview DO	4.00%	167	84	84
Warner Lake RA	1.00%	42	31	10
High Desert RA	1.00%	42	31	10
Colocation Total		251	146	105
Klamath Falls RA	1.00%	42	31	10
*Medford DO	6.00%	251	126	126
Klamath RA	1.00%	42	31	10
Butte Falls RA	1.00%	42	31	10
Jacksonville RA	1.00%	42	31	10
Grants Pass RA	1.00%	42	31	10
Glendale RA	1.00%	42	31	10
Colocation Total		460	282	178
*Prineville DO	5.00%	209	105	105
Central Oregon RA	1.00%	42	31	10
Deschutes RA	1.00%	42	31	10
Colocation Total		293	167	126
*Roseburg DO	1.00%	42	21	21
North Umpqua RA	1.00%	42	31	10
South Umpqua RA	1.00%	42	31	10
Dillard RA	1.00%	42	31	10
Drain RA	1.00%	42	31	10
Colocation Total		209	146	63
*Salem DO	2.00%	84	42	42

VOLUME OF INPUT TRANSACTIONS TO THE QUERY TASKS
FOR ALPHANUMERIC OUTPUT PER DAY FOR 1985

TABLE A-7 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Santiam RA	1.00%	42	31	10
Alsea RA	1.00%	42	31	10
Yamhill RA	1.00%	42	31	10
Clackamas RA	1.00%	42	31	10
Colocation Total		251	167	84
Tillamook RA	1.00%	42	31	10
*Spokane DO	6.00%	251	126	126
Border RA	1.00%	42	31	10
Colocation Total		293	157	136
Wenatchee RA	1.00%	42	31	10
*Vale DO	5.00%	209	105	105
N. Malheur RA	1.00%	42	31	10
S. Malheur RA	1.00%	42	31	10
Colocation Total		293	167	126
Baker RA	1.00%	42	31	10
Oregon Subtotal		4,184	2,437	1,747
Utah	9.88%	7,018		
Utah State Office	27.00%	1,895	947	947
*Salt Lake DO	3.00%	211	105	105
Bear River RA	3.00%	211	158	53
Pony Express RA	1.00%	70	53	18
Colocation Total		491	316	175
Cedar City DO	4.00%	281	140	140
Kanab RA	3.00%	211	158	53
Escalante RA	1.00%	70	53	18
Beaver River RA	3.00%	211	158	53
Richfield DO	5.00%	351	175	175
*Warm Springs RA	2.00%	140	105	35
House Range RA	1.00%	70	53	18
Colocation Total		211	158	53
Henry Mountain RA	1.00%	70	53	18
Sevier River RA	2.00%	140	105	35
Moab DO	9.00%	632	316	316
San Juan RA	6.00%	421	316	105
Grand RA	5.00%	351	263	88
*Price River RA	3.00%	211	158	53
San Rafael RA	6.00%	421	316	105
Colocation Total		632	474	158
*Vernal DO	6.00%	421	211	211
Diamond Mountain RA	4.00%	281	211	70
Book Cliffs RA	4.00%	281	211	70
Colocation Total		982	632	351

VOLUME OF INPUT TRANSACTIONS TO THE QUERY TASKS
FOR ALPHANUMERIC OUTPUT PER DAY FOR 1985

TABLE A-7 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Utah Subtotal		6,947	4,263	2,684
Wyoming	20.64%	14,660		
Wyoming State Office	23.00%	3,372	1,686	1,686
Casper DO	14.00%	2,052	1,026	1,026
Platte River RA	4.00%	586	440	147
Buffalo RA	4.00%	586	440	147
Newcastle RA	5.00%	733	550	183
Rawlins DO	10.00%	1,466	733	733
*Divide RA	3.00%	440	330	110
Medicine Bow RA	2.00%	293	220	73
Colocation Total		733	550	183
Lander RA	3.00%	440	330	110
Rock Springs DO	10.00%	1,466	733	733
*Big Sandy RA	2.00%	293	220	73
Salt Wells RA	4.00%	586	440	147
Colocation Total		880	660	220
Kemmerer RA	4.00%	586	440	147
Pinedale RA	2.00%	293	220	73
*Worland DO	6.00%	880	440	440
Grass Creek RA	1.00%	147	110	37
Washakie RA	1.00%	147	110	37
Colocation Total		1,173	660	513
Cody RA	2.00%	293	220	73
Wyoming Subtotal		14,660	8,686	5,974
TOTAL		88,784	42,453	28,575

VOLUME OF INPUT TRANSACTIONS TO THE QUERY TASKS
FOR ALPHANUMERIC OUTPUT PER DAY FOR 1985

TABLE A-7 (Continued)

A.8 Volume of Input Transactions to the Query Tasks for Graphic Output Per Day for 1985.

Table A-8, "Volume of Input Transactions to the Query Tasks for Graphic Output Per Day for 1985," shows volume of graphic input transactions by BLM office and divides the transactions into internal and public transactions. External transactions (transactions by agencies external to BLM) are shown by state on the rows titled "(state name) Office-Ext."

The BLM offices are listed in the left column of this table. The State, District, and Area Office sites are listed under each state, using the same techniques used for Table A-1.

The column titled "Percentage of Spread" shows the allocation of the input transactions to each state and to offices within that state, as explained for Table A-5.

The column titled "Total Transactions" shows the number of transactions by site. At the state level, the transactions column shows the state total. The column titled "Internal Transactions" shows the number of transactions conducted by BLM personnel in each BLM office. The column titled "Public Transactions" shows the number of transactions conducted by the public in each BLM office.

The data in this table were derived from Algorithm 8A, "Algorithm for Determining the Graphics Requirements in the Query Module," of the "ALMRS Requirements Document." This total was multiplied by 80 percent and 20 percent to produce the volume of internal and external transactions, using the same rationale used to produce Table A-7.

OFFICE	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Headquarters	0.10%	36	36	
Denver Service Center	0.20%	71	71	
Arizona	3.74%	1,328		
Arizona State Office-Ext	3.74%	332	332	
Arizona State Office	36.00%	478	239	239
Arizona Strip DO	3.00%	40	20	20
*Vermillon RA	2.00%	27	20	7
Shivwits RA	2.00%	27	20	7
Dixie RA (Utah)[1]	1.00%	35	26	9
Colocation Total		88	66	22
*Phoenix DO	10.00%	133	66	66
Lower Gila RA	9.00%	120	90	30
Phoenix RA	11.00%	146	110	37
Colocation Total		398	266	133
Kingman RA	11.00%	146	110	37
*Safford DO	3.00%	40	20	20
San Simon RA	4.00%	53	40	13
Gila RA	3.00%	40	30	10
Colocation Total		133	90	43
*Yuma DO	2.00%	27	13	13
Yuma RA	2.00%	27	20	7
Colocation Total		53	33	20
Havasu RA	2.00%	27	20	7
Arizona Subtotal		1,695	1,175	520
California	5.66%	2,010		
California State Office-Ext	5.66%	503	503	
California State Office	22.00%	442	221	221
Bakersfield DO	7.00%	141	70	70
Bishop RA	4.00%	80	60	20
Caliente RA	5.00%	101	75	25
Folsom RA	5.00%	101	75	25
Hollister RA	3.00%	60	45	15
Susanville DO	4.00%	80	40	40
Eagle Lake RA	1.00%	20	15	5
Cedarville RA	1.00%	20	15	5
Alturas RA	1.00%	20	15	5
*Ukiah DO	9.00%	181	90	90
Clear Lake RA	3.00%	60	45	15
Colocation Total		241	136	106
Arcata RA	3.00%	60	45	15
Redding RA	7.00%	141	106	35
California Desert DO	9.00%	181	90	90

1 = Colocated in Arizona but included in Utah figures.

VOLUME OF INPUT TRANSACTIONS TO THE QUERY TASKS
FOR GRAPHIC OUTPUT PER DAY FOR 1985

TABLE A-8

OFFICE	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
El Centro RA	5.00%	101	75	25
Barstow RA	3.00%	60	45	15
Indio RA	2.00%	40	30	10
Needles RA	2.00%	40	30	10
Ridgecrest RA	4.00%	80	60	20
California Subtotal		2,513	1,754	759
Colorado	8.11%	2,880		
Colorado State Office-Ext	8.11%	720	720	
Colorado State Office	24.00%	691	346	346
Canon City DO	5.00%	144	72	72
Northeast RA	3.00%	86	65	22
San Luis RA	3.00%	86	65	22
Royal Gorge RA	4.00%	115	86	29
Craig DO	10.00%	288	144	144
Kremmling RA	2.00%	58	43	14
White River RA	7.00%	202	151	50
Little Snake RA	3.00%	86	65	22
*Grand Junction DO	8.00%	230	115	115
Grand Junction RA	4.00%	115	86	29
Colocation Total		346	202	144
Glenwood Springs RA	4.00%	115	86	29
*Montrose DO	7.00%	202	101	101
Uncompahgre Basin RA	4.00%	115	86	29
Colocation Total		317	187	130
Gunnison Basin RA	4.00%	115	86	29
San Juan RA	8.00%	230	173	58
Colorado Subtotal		3,600	2,491	1,109
Eastern States	6.61%	2,347		
Eastern States Office-Ext	6.61%	587	587	
Eastern States Office	64.00%	1,502	751	751
Jackson DO	18.00%	423	211	211
Milwaukee DO	17.00%	399	200	200
Rolla RA	1.00%	23	18	6
Eastern States Subtotal		2,934	1,766	1,168
Idaho	3.85%	1,367		
Idaho State Office-Ext	3.85%	342	342	
Idaho State Office	35.00%	479	239	239
*Boise DO	9.00%	123	62	62
Cascade RA	2.00%	27	21	7

VOLUME OF INPUT TRANSACTIONS TO THE QUERY TASKS
FOR GRAPHIC OUTPUT PER DAY FOR 1985

TABLE A-8 (Continued)

OFFICE	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Owyhee RA	4.00%	55	41	14
Bruneau RA	5.00%	68	51	17
Jarbidge RA	1.00%	14	10	3
Colocation Total		287	185	103
*Burley DO	2.00%	27	14	14
Deep Creek RA	2.00%	27	21	7
Snake River RA	2.00%	27	21	7
Colocation Total		82	55	27
*Coeur d'Alene DO	2.00%	27	14	14
Emerald Empire RA	2.00%	27	21	7
Colocation Total		55	34	21
Cottonwood RA	4.00%	55	41	14
*Idaho Falls DO	6.00%	82	41	41
Big Butte RA	3.00%	41	31	10
Medicine Lodge RA	1.00%	14	10	3
Colocation Total		137	82	55
Pocatello RA	7.00%	96	72	24
*Salmon DO	2.00%	27	14	14
Lemhi RA	2.00%	27	21	7
Challis RA	2.00%	27	21	7
Colocation Total		82	55	27
*Shoshone DO	2.00%	27	14	14
Monument RA	1.00%	14	10	3
Bennett Hills RA	4.00%	55	41	14
Colocation Total		96	65	31
Idaho Subtotal		1,709	1,169	540
Montana	12.22%	4,340		
Montana State Office-Ext	12.22%	1,085	1,085	
Montana State Office	27.00%	1,172	586	586
*Butte DO	6.00%	260	130	130
Headwaters RA	2.00%	87	65	22
Colocation Total		347	195	152
Dillon RA	4.00%	174	130	43
Garnet RA	4.00%	174	130	43
Miles City DO	10.00%	434	217	217
*Big Dry RA	4.00%	174	130	43
Powder River RA	4.00%	174	130	43
Colocation Total		347	260	87
South Dakota RA	1.00%	43	33	11
Billings RA	5.00%	217	163	54
Dickinson DO	9.00%	391	195	195
*Lewistown DO	8.00%	347	174	174
Judith RA	3.00%	130	98	33

VOLUME OF INPUT TRANSACTIONS TO THE QUERY TASKS
FOR GRAPHIC OUTPUT PER DAY FOR 1985

TABLE A-8 (Continued)

OFFICE	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Colocation Total		477	271	206
Phillips RA	5.00%	217	163	54
Havre RA	1.00%	43	33	11
Valley RA	1.00%	43	33	11
Great Falls RA	6.00%	260	195	65
Montana Subtotal		5,425	3,906	1,519
Nevada	7.92%	2,813		
Nevada State Office-Ext	7.92%	703	703	
Nevada State Office	27.00%	759	380	380
*Battle Mountain DO	4.00%	113	56	56
Shoshone-Eureka RA	2.00%	56	42	14
Colocation Total		169	98	70
Tonopah RA	5.00%	141	105	35
*Carson City DO	5.00%	141	70	70
Lahontan RA	5.00%	141	105	35
Walker RA	2.00%	56	42	14
Colocation Total		338	218	120
*Elko DO	3.00%	84	42	42
Elko RA	2.00%	56	42	14
Wells RA	2.00%	56	42	14
Colocation Total		197	127	70
*Ely DO	3.00%	84	42	42
Egan RA	2.00%	56	42	14
Schell RA	2.00%	56	42	14
Colocation Total		197	127	70
Las Vegas DO	12.00%	338	169	169
Stateline-Esmeralda RA	3.00%	84	63	21
Caliente RA	12.00%	338	253	84
*Winnemucca DO	2.00%	56	28	28
Paradise-Denio RA	2.00%	56	42	14
Sonoma-Gerlach RA	5.00%	141	105	35
Colocation Total		253	176	77
Nevada Subtotal		3,516	2,419	1,097
New Mexico	15.18%	5,391		
New Mexico State Office-Ext	15.18%	1,348	1,348	
New Mexico State Office	27.00%	1,456	728	728
Albuquerque DO	14.00%	755	377	377
Rio Peuerco RA	6.00%	323	243	81
Farmington RA	11.00%	593	445	148
Taos RA	2.00%	108	81	27
*Las Cruces DO	5.00%	270	135	135

VOLUME OF INPUT TRANSACTIONS TO THE QUERY TASKS
FOR GRAPHIC OUTPUT PER DAY FOR 1985

TABLE A-8 (Continued)

OFFICE	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Las Cruces/Lordsburg RA	3.00%	162	121	40
White Sands RA	1.00%	54	40	13
Colocation Total		485	297	189
Socorro RA	2.00%	108	81	27
Tulsa DO	3.00%	162	81	81
Oklahoma RA	4.00%	216	162	54
Roswell DO	11.00%	593	297	297
Roswell RA	6.00%	323	243	81
Carlsbad RA	5.00%	270	202	67
New Mexico Subtotal		6,739	4,582	2,156
Oregon	5.89%	2,092		
Oregon State Office-Ext	5.89%	523	523	
Oregon State Office	32.00%	669	335	335
*Burns DO	4.00%	84	42	42
Three Rivers RA	1.00%	21	16	5
Andrews RA	1.00%	21	16	5
Colocation Total		126	73	52
*Coos Bay DO	1.00%	21	10	10
Myrtlewood RA	1.00%	21	16	5
Tioga RA	1.00%	21	16	5
Umpqua RA	1.00%	21	16	5
Colocation Total		84	58	26
*Eugene DO	1.00%	21	10	10
Noti RA	1.00%	21	16	5
Dorena RA	1.00%	21	16	5
Mohawk RA	1.00%	21	16	5
Colocation Total		84	58	26
Lorane RA	1.00%	21	16	5
*Lakeview DO	4.00%	84	42	42
Warner Lake RA	1.00%	21	16	5
High Desert RA	1.00%	21	16	5
Colocation Total		126	73	52
Klamath Falls RA	1.00%	21	16	5
*Medford DO	6.00%	126	63	63
Klamath RA	1.00%	21	16	5
Butte Falls RA	1.00%	21	16	5
Jacksonville RA	1.00%	21	16	5
Grants Pass RA	1.00%	21	16	5
Glendale RA	1.00%	21	16	5
Colocation Total		230	141	89
*Prineville DO	5.00%	105	52	52
Central Oregon RA	1.00%	21	16	5
Deschutes RA	1.00%	21	16	5

VOLUME OF INPUT TRANSACTIONS TO THE QUERY TASKS
FOR GRAPHIC OUTPUT PER DAY FOR 1985

TABLE A-8 (Continued)

OFFICE	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Colocation Total		146	84	63
*Roseburg DO	1.00%	21	10	10
North Umpqua RA	1.00%	21	16	5
South Umpqua RA	1.00%	21	16	5
Dillard RA	1.00%	21	16	5
Drain RA	1.00%	21	16	5
Colocation Total		105	73	31
*Salem DO	2.00%	42	21	21
Santiam RA	1.00%	21	16	5
Alsea RA	1.00%	21	16	5
Yamhill RA	1.00%	21	16	5
Clackamas RA	1.00%	21	16	5
Colocation Total		126	84	42
Tillamook RA	1.00%	21	16	5
*Spokane DO	6.00%	126	63	63
Border RA	1.00%	21	16	5
Colocation Total		146	78	68
Wenatchee RA	1.00%	21	16	5
*Vale DO	5.00%	105	52	52
N. Malheur RA	1.00%	21	16	5
S. Malheur RA	1.00%	21	16	5
Colocation Total		146	84	63
Baker RA	1.00%	21	16	5
Oregon Subtotal		2,615	1,741	873
Utah	9.88%	3,509		
Utah State Office-Ext	9.88%	877	877	
Utah State Office	27.00%	947	474	474
*Salt Lake DO	3.00%	105	53	53
Bear River RA	3.00%	105	79	26
Pony Express RA	1.00%	35	26	9
Colocation Total		246	158	88
Cedar City DO	4.00%	140	70	70
Kanab RA	3.00%	105	79	26
Escalante RA	1.00%	35	26	9
Beaver River RA	3.00%	105	79	26
Richfield DO	5.00%	175	88	88
*Warm Springs RA	2.00%	70	53	18
House Range RA	1.00%	35	26	9
Colocation Total		105	79	26
Henry Mountain RA	1.00%	35	26	9
Sevier River RA	2.00%	70	53	18
Moab DO	9.00%	316	158	158
San Juan RA	6.00%	211	158	53

VOLUME OF INPUT TRANSACTIONS TO THE QUERY TASKS
FOR GRAPHIC OUTPUT PER DAY FOR 1985

TABLE A-8 (Continued)

OFFICE	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Grand RA	5.00%	175	132	44
*Price River RA	3.00%	105	79	26
San Rafael RA	6.00%	211	158	53
Colocation Total		316	237	79
*Vernal DO	6.00%	211	105	105
Diamond Mountain RA	4.00%	140	105	35
Book Cliffs RA	4.00%	140	105	35
Colocation Total		491	316	175
Utah Subtotal		4,351	3,009	1,342
Wyoming	20.64%	7,330		
Wyoming State Office-Ext	20.94%	1,859	1,859	
Wyoming State Office	23.00%	1,686	843	843
Casper DO	14.00%	1,026	513	513
Platte River RA	4.00%	293	220	73
Buffalo RA	4.00%	293	220	73
Newcastle RA	5.00%	367	275	92
Rawlins DO	10.00%	733	367	367
*Divide RA	3.00%	220	165	55
Medicine Bow RA	2.00%	147	110	37
Colocation Total		367	275	92
Lander RA	3.00%	220	165	55
Rock Springs DO	10.00%	733	367	367
*Big Sandy RA	2.00%	147	110	37
Salt Wells RA	4.00%	293	220	73
Colocation Total		440	330	110
Kemmerer RA	4.00%	293	220	73
Pinedale RA	2.00%	147	110	37
*Worland DO	6.00%	440	220	220
Grass Creek RA	1.00%	73	55	18
Washakie RA	1.00%	73	55	18
Colocation Total		586	330	257
Cody RA	2.00%	147	110	37
Wyoming Subtotal		9,189	6,202	2,987
TOTAL		44,392	30,105	14,287

VOLUME OF INPUT TRANSACTIONS TO THE QUERY TASKS
FOR GRAPHIC OUTPUT PER DAY FOR 1985

TABLE A-8 (Continued)

A.9 Volume of Input to Current System From External Systems and Files in Thousands of Characters Per Day for 1985.

Table A-9, "Volume of Input to Current System From External Systems and Files in Thousands of Characters Per Day for 1985," shows the volume of input from external systems and files to which the current system interfaces by task (Case Processing, Management Reporting, and Query). The numbers in the columns are the estimates of the volume of input (in thousands of characters per day) to the current system by task from the systems and files listed in the left column.

The data in this table were derived from two sources. The first source is the "Future System Document," which provided the size of the different interfaced systems and files (found on the Computation Sheet in Module A, "Basic Storage Interface and Narrative Description") and the growth factors for the years 1985 to 1992. The growth factor is found on Table 2.2 of Module 1, "Verification and Case Processing." Because volumes in the "Future System Document" were produced for the year 1992 only, the volume had to be reduced by the growth factor to derive the 1985 estimate. The size of the interfaces was then multiplied by a percentage of use derived from the second source.

The second source was a meeting between DSC personnel and FEDSIM personnel. During this meeting, estimates of the percentage of each interfaced file and system used for different current system tasks was developed. This was then multiplied by the size of each system or file to produce the amount of data in those files that is input to the current system.

SYSTEMS/FILES	CASE PROCESSING (CHARACTERS x 1000)	MANAGEMENT REPORTING (CHARACTERS x 1000)	QUERY (CHARACTERS x 1000)
Bond	25	25	25
Surety	3	0	0
Qualification	3	3	0
Financial Management	9,281	9,281	0
Mineral System 1	6,023	2,409	0
Solid Leasable Mineral	1,774	710	0
Simultaneous Oil & Gas Leasing	2,145	0	0
Total	19,254	12,428	25

VOLUME OF INPUT TO THE CURRENT SYSTEM FROM EXTERNAL SYSTEMS AND FILES IN THOUSANDS OF CHARACTERS PER DAY FOR 1985

TABLE A-9

A.10 Volume of Output From Current System to External Systems and Files in Thousands of Characters Per Day for 1985.

Table A-10, "Volume of Output From Current System to External Systems and Files in Thousands of Characters Per Day for 1985," shows the volume of input from the current system to systems and files to which the current system interfaces by task (Case Processing, Management Reporting, and Query). The numbers in the columns are estimates of the volume of output (in thousands of characters per day) from the current system by function to the systems and files listed in the left column.

These data in this table were derived using the same techniques and sources of information used to produce Table A-9. The "Future System Document" contained estimates of the size of the interfaced systems and files, found on the Computation Sheet in Module A, "Basic Storage Interface and Narrative Description". The growth factor for the years 1985 to 1992 is found in Table 2.2 of Module 1, "Verification and Case Processing." This factor was then multiplied by the size of each system or file to produce the amount of data in those files that is output from the current system.

SYSTEMS/FILES	CASE PROCESSING (CHARACTERS x 1000)	MANAGEMENT REPORTING (CHARACTERS x 1000)	QUERY (CHARACTERS x 1000)
Bond	25	0	0
Surety	0	0	0
Qualification	0	0	0
Financial Management	9,281	0	0
Mineral System 1	12,045	0	0
Solid Leasable Mineral	3,548	0	0
Simultaneous Oil & Gas Leasing	4,290	0	0
Total	29,189	0	0

VOLUME OF OUTPUT FROM THE CURRENT SYSTEM TO EXTERNAL SYSTEMS AND FILES IN THOUSANDS OF CHARACTERS PER DAY FOR 1985

TABLE A-10

APPENDIX B

TABLES DESCRIBING ALMRS WORKLOAD

B.1 Volume of Input Transactions to the Case Processing Function Per Day for 1997.

Table B-1, "Volume of Input Transactions to the Case Processing Function Per Day for 1997," shows the estimated volume of input to the ALMRS Case Processing functions in 1997. It shows the total transactions, alphanumeric transactions, and graphic transactions for each BLM office. The purpose of this table is to estimate the Case Processing Functions's input workload per office per day.

The left column of this table lists each BLM office, grouped by state. The State, District, and Area offices are listed under each state. Each office beginning at the left margin is a unique, separate location. The offices listed with their names indented are co-located, i.e., physically located together. The office marked with a leading asterisk is the primary office of the co-located offices. The rows marked "Co-location Total" sum input transactions for each column of the co-located offices.

The 212 BLM offices are located at 137 sites. The offices in each state are grouped together between dashed lines. The row with the state name contains the state subtotal for each of the columns. The data for co-locating the sites was provided by the Denver Service Center (DSC) in a letter dated September 13, 1985. The table providing the data is titled "Revision of Table V-4: BLM ALMRS Users-FTE."

The column titled "Total Transactions" shows the number of transactions of each BLM office, subtotaled by state. The column titled "Alphanumeric Transactions" shows the number of alphanumeric output transactions by each BLM office. The column titled "Graphic Transactions" shows the number of graphic output transactions of each BLM office.

The estimates of alphanumeric and graphic case processing transactions were computed using data in Table 2, "Case Processing - Input/Output Pages" of the ALMRS "Requirements Document." The totals were then divided by 1.275 (the growth that is estimated to occur each year in years 1985 through 1992). These totals were then distributed among the different sites to create the two columns, "A/N Transactions" and "Graphic Transactions". These columns were then added together to produce the "Total Transactions" column.

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	ALPHA-NUMERIC TRANS-ACTIONS	GRAPHIC TRANS-ACTIONS
Headquarters				
Denver Service Center				
Arizona	3.74%	871	803	68
Arizona State Office	36.00%	314	289	24
Arizona Strip DO	3.00%	26	24	2
*Vermillon RA	2.00%	17	16	1
Shivwits RA	2.00%	17	16	1
Dixie RA (Utah)[1]	1.00%	23	21	1
Colocation Total		58	53	3
*Phoenix DO	10.00%	87	80	7
Lower Gila RA	9.00%	78	72	6
Phoenix RA	11.00%	96	88	7
Colocation Total		261	241	20
Kingman RA	11.00%	96	88	7
*Safford DO	3.00%	26	24	2
San Simon RA	4.00%	35	32	3
Gila RA	3.00%	26	24	2
Colocation Total		87	80	7
*Yuma DO	2.00%	17	16	1
Yuma RA	2.00%	17	16	1
Colocation Total		35	32	3
Havasu RA	2.00%	17	16	1
California	5.66%	1,318	1,215	103
California State Office	22.00%	290	267	23
Bakersfield DO	7.00%	92	85	7
Bishop RA	4.00%	53	49	4
Caliente RA	5.00%	66	61	5
Folsom RA	5.00%	66	61	5
Hollister RA	3.00%	40	36	3
Susanville DO	4.00%	53	49	4
Eagle Lake RA	1.00%	13	12	1
Cedarville RA	1.00%	13	12	1
Alturas RA	1.00%	13	12	1
*Ukiah DO	9.00%	119	109	9
Clear Lake RA	3.00%	40	36	3
Colocation Total		158	146	12
Arcata RA	3.00%	40	36	3
Redding RA	7.00%	92	85	7
California Desert DO	9.00%	119	109	9
El Centro RA	5.00%	66	61	5
Barstow RA	3.00%	40	36	3
Indio RA	2.00%	26	24	2

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1 = Colocated in Arizona but included in Utah figures.

VOLUME OF INPUT TRANSACTIONS TO THE CASE PROCESSING FUNCTION PER DAY FOR 1997

TABLE B-1

OFFICES	PERCENTAGE SPREAD	TOTAL TRANSACTIONS	ALPHA-NUMERIC TRANSACTIONS	GRAPHIC TRANSACTIONS
Needles RA	2.00%	26	24	2
Ridgecrest RA	4.00%	53	49	4
Colorado	8.11%	1,889	1,742	147
Colorado State Office	24.00%	453	418	35
Canon City DO	5.00%	94	87	7
Northeast RA	3.00%	57	52	4
San Luis RA	3.00%	57	52	4
Royal Gorge RA	4.00%	76	70	6
Craig DO	10.00%	189	174	15
Kremmling RA	2.00%	38	35	3
White River RA	7.00%	132	122	10
Little Snake RA	3.00%	57	52	4
*Grand Junction DO	8.00%	151	139	12
Grand Junction RA	4.00%	76	70	6
Colocation Total		227	209	18
Glenwood Springs RA	4.00%	76	70	6
*Montrose DO	7.00%	132	122	10
Uncompahgre Basin RA	4.00%	76	70	6
Colocation Total		208	192	16
Gunnison Basin RA	4.00%	76	70	6
San Juan RA	8.00%	151	139	12
Eastern States	6.61%	1,539	1,419	120
Eastern States Office	64.00%	985	908	77
Jackson DO	18.00%	277	255	22
Milwaukee DO	17.00%	262	241	20
Rolla RA	1.00%	15	14	1
Idaho	3.85%	897	827	70
Idaho State Office	35.00%	314	289	24
*Boise DO	9.00%	81	74	6
Cascade RA	2.00%	18	17	1
Owyhee RA	4.00%	36	33	3
Bruneau RA	5.00%	45	41	3
Jarbidge RA	1.00%	9	8	1
Colocation Total		188	174	15
*Burley DO	2.00%	18	17	1
Deep Creek RA	2.00%	18	17	1
Snake River RA	2.00%	18	17	1
Colocation Total		54	50	4
*Coeur d'Alene DO	2.00%	18	17	1
Emerald Empire RA	2.00%	18	17	1
Colocation Total		36	33	3

VOLUME OF INPUT TRANSACTIONS TO THE CASE PROCESSING FUNCTION PER DAY FOR 1997

TABLE B-1 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	ALPHA-NUMERIC TRANS-ACTIONS	GRAPHIC TRANS-ACTIONS
Cottonwood RA	4.00%	36	33	3
*Idaho Falls DO	6.00%	54	50	4
Big Butte RA	3.00%	27	25	2
Medicine Lodge RA	1.00%	9	8	1
Colocation Total		90	83	7
Pocatello RA	7.00%	63	58	5
*Salmon DO	2.00%	18	17	1
Lemhi RA	2.00%	18	17	1
Challis RA	2.00%	18	17	1
Colocation Total		54	50	4
*Shoshone DO	2.00%	18	17	1
Monument RA	1.00%	9	8	1
Bennett Hills RA	4.00%	36	33	3
Colocation Total		63	58	5
Montana	12.22%	2,846	2,624	222
Montana State Office	27.00%	768	709	60
*Butte DO	6.00%	171	157	13
Headwaters RA	2.00%	57	52	4
Colocation Total		228	210	18
Dillon RA	4.00%	114	105	9
Garnet RA	4.00%	114	105	9
Miles City DO	10.00%	285	262	22
*Big Dry RA	4.00%	114	105	9
Powder River RA	4.00%	114	105	9
Colocation Total		228	210	18
South Dakota RA	1.00%	28	26	2
Billings RA	5.00%	142	131	11
Dickinson DO	9.00%	256	236	20
*Lewistown DO	8.00%	228	210	18
Judith RA	3.00%	85	79	7
Colocation Total		313	289	24
Phillips RA	5.00%	142	131	11
Havre RA	1.00%	28	26	2
Valley RA	1.00%	28	26	2
Great Falls RA	6.00%	171	157	13
Nevada	7.92%	1,845	1,701	144
Nevada State Office	27.00%	498	459	39
*Battle Mountain DO	4.00%	74	68	6
Shoshone-Eureka RA	2.00%	37	34	3
Colocation Total		111	102	9
Tonopah RA	5.00%	92	85	7
*Carson City DO	5.00%	92	85	7

VOLUME OF INPUT TRANSACTIONS TO THE CASE PROCESSING FUNCTION PER DAY FOR 1997

TABLE B-1 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	ALPHA-NUMERIC TRANS-ACTIONS	GRAPHIC TRANS-ACTIONS
Lahontan RA	5.00%	92	85	7
Walker RA	2.00%	37	34	3
Colocation Total		221	204	17
*Elko DO	3.00%	55	51	4
Elko RA	2.00%	37	34	3
Wells RA	2.00%	37	34	3
Colocation Total		129	119	10
*Ely DO	3.00%	55	51	4
Egan RA	2.00%	37	34	3
Schell RA	2.00%	37	34	3
Colocation Total		129	119	10
Las Vegas DO	12.00%	221	204	17
Stateline-Esmeralda RA	3.00%	55	51	4
Caliente RA	12.00%	221	204	17
*Winnemucca DO	2.00%	37	34	3
Paradise-Denio RA	2.00%	37	34	3
Sonoma-Gerlach RA	5.00%	92	85	7
Colocation Total		166	153	13
New Mexico	15.18%	3,535	3,260	276
New Mexico State Office	27.00%	955	880	74
Albuquerque DO	14.00%	495	456	39
Rio Peuerco RA	6.00%	212	196	17
Farmington RA	11.00%	389	359	30
Taos RA	2.00%	71	65	6
*Las Cruces DO	5.00%	177	163	14
Las Cruces/Lordsburg RA	3.00%	106	98	8
White Sands RA	1.00%	35	33	3
Colocation Total		318	293	25
Socorro RA	2.00%	71	65	6
Tulsa DO	3.00%	106	98	8
Oklahoma RA	4.00%	141	130	11
Roswell DO	11.00%	389	359	30
Roswell RA	6.00%	212	196	17
Carlsbad RA	5.00%	177	163	14
Oregon	5.89%	1,372	1,265	107
Oregon State Office	32.00%	439	405	34
*Burns DO	4.00%	55	51	4
Three Rivers RA	1.00%	14	13	1
Andrews RA	1.00%	14	13	1
Colocation Total		82	76	6
*Coos Bay DO	1.00%	14	13	1
Myrtlewood RA	1.00%	14	13	1

VOLUME OF INPUT TRANSACTIONS TO THE CASE PROCESSING FUNCTION PER DAY FOR 1997

TABLE B-1 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	ALPHA-NUMERIC TRANS-ACTIONS	GRAPHIC TRANS-ACTIONS
Tioga RA	1.00%	14	13	1
Umpqua RA	1.00%	14	13	1
Colocation Total		55	51	4
*Eugene DO	1.00%	14	13	1
Noti RA	1.00%	14	13	1
Dorena RA	1.00%	14	13	1
Mohawk RA	1.00%	14	13	1
Colocation Total		55	51	4
Lorane RA	1.00%	14	13	1
*Lakeview DO	4.00%	55	51	4
Warner Lake RA	1.00%	14	13	1
High Desert RA	1.00%	14	13	1
Colocation Total		82	76	6
Klamath Falls RA	1.00%	14	13	1
*Medford DO	6.00%	82	76	6
Klamath RA	1.00%	14	13	1
Butte Falls RA	1.00%	14	13	1
Jacksonville RA	1.00%	14	13	1
Grants Pass RA	1.00%	14	13	1
Glendale RA	1.00%	14	13	1
Colocation Total		151	139	12
*Prineville DO	5.00%	69	63	5
Central Oregon RA	1.00%	14	13	1
Deschutes RA	1.00%	14	13	1
Colocation Total		96	89	7
*Roseburg DO	1.00%	14	13	1
North Umpqua RA	1.00%	14	13	1
South Umpqua RA	1.00%	14	13	1
Dillard RA	1.00%	14	13	1
Drain RA	1.00%	14	13	1
Colocation Total		69	63	5
*Salem DO	2.00%	27	25	2
Santiam RA	1.00%	14	13	1
Alsea RA	1.00%	14	13	1
Yamhill RA	1.00%	14	13	1
Clackamas RA	1.00%	14	13	1
Colocation Total		82	76	6
Tillamook RA	1.00%	14	13	1
*Spokane DO	6.00%	82	76	6
Border RA	1.00%	14	13	1
Colocation Total		96	89	7
Wenatchee RA	1.00%	14	13	1
*Vale DO	5.00%	69	63	5
N. Malheur RA	1.00%	14	13	1

VOLUME OF INPUT TRANSACTIONS TO THE CASE PROCESSING FUNCTION PER DAY FOR 1997

TABLE B-1 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	ALPHA-NUMERIC TRANS-ACTIONS	GRAPHIC TRANS-ACTIONS
S. Malheur RA	1.00%	14	13	1
Colocation Total		96	89	7
Baker RA	1.00%	14	13	1
Utah	9.88%	2,301	2,122	179
Utah State Office	27.00%	621	573	48
*Salt Lake DO	3.00%	69	64	5
Bear River RA	3.00%	69	64	5
Pony Express RA	1.00%	23	21	2
Colocation Total		161	149	13
Cedar City DO	4.00%	92	85	7
Kanab RA	3.00%	69	64	5
Escalante RA	1.00%	23	21	2
Beaver River RA	3.00%	69	64	5
Richfield DO	5.00%	115	106	9
*Warm Springs RA	2.00%	46	42	4
House Range RA	1.00%	23	21	2
Colocation Total		69	64	5
Henry Mountain RA	1.00%	23	21	2
Sevier River RA	2.00%	46	42	4
Moab DO	9.00%	207	191	16
San Juan RA	6.00%	138	127	11
Grand RA	5.00%	115	106	9
*Price River RA	3.00%	69	64	5
San Rafael RA	6.00%	138	127	11
Colocation Total		207	191	16
*Vernal DO	6.00%	138	127	11
Diamond Mountain RA	4.00%	92	85	7
Book Cliffs RA	4.00%	92	85	7
Colocation Total		322	297	25
Wyoming	20.94%	4,877	4,497	380
Wyoming State Office	23.00%	1,122	1,034	87
Casper DO	14.00%	683	630	53
Platte River RA	4.00%	195	180	15
Buffalo RA	4.00%	195	180	15
Newcastle RA	5.00%	244	225	19
Rawlins DO	10.00%	488	450	38
*Divide RA	3.00%	146	135	11
Medicine Bow RA	2.00%	98	90	8
Colocation Total		244	225	19
Lander RA	3.00%	146	135	11
Rock Springs DO	10.00%	488	450	38
*Big Sandy RA	2.00%	98	90	8

VOLUME OF INPUT TRANSACTIONS TO THE CASE PROCESSING FUNCTION PER DAY FOR 1997

TABLE B-1 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	ALPHA-NUMERIC TRANS-ACTIONS	GRAPHIC TRANS-ACTIONS
Salt Wells RA	4.00%	195	180	15
Colocation Total		293	270	23
Kemmerer RA	4.00%	195	180	15
Pinedale RA	2.00%	98	90	8
*Worland DO	6.00%	293	270	23
Grass Creek RA	1.00%	49	45	4
Washakie RA	1.00%	49	45	4
Colocation Total		390	360	30
Cody RA	2.00%	98	90	8
TOTAL		23,290	21,474	1,816

VOLUME OF INPUT TRANSACTIONS TO THE CASE PROCESSING FUNCTION PER DAY FOR 1997

TABLE B-1 (Continued)

B.2 Volume of Input Transactions to the Query Function for Alphanumeric Output Per Day for 1997.

Table B-2, "Volume of Input Transactions to the Query Function for Alphanumeric Output Per Day for 1997," shows the estimated volume of input transactions to the ALMRS Query functions per day in 1997. The total transactions are divided into internal transactions and public transactions for each BLM office.. External transactions (transactions of agencies that are external to BLM) are shown on the row titled "Denver Service Center-Ext."

The left column of this table lists each BLM office, grouped by state. The State, District, and Area offices are listed under each state, as explained for Table B-1.

The column titled "Percentage of Spread" shows the allocation of the input transactions to each state and to offices within that state. The same techniques and sources of information used to produce Table B-1 were used to produce Table B-2.

The total number of alphanumeric query transactions was computed using Algorithm 8 - "Module of Work Query (for Alphanumeric)" of the ALMRS "Requirements Document." This total was multiplied by 80 percent to estimate the number of internal and public queries. The remaining 20 percent of the workload is that of external users, which is shown as "Denver Service Center-Ext." These estimates were confirmed at meetings between DSC and FEDSIM personnel.

After multiplying by 80 percent, the total was then divided by 1.275 (the percent of growth between the years 1985 to 1992) and then multiplied by by 1.511 (the percent growth between the years 1985 and 1997). This was done because the original document produced estimates for 1992 only. The estimates of growth were developed during meetings between DSC and FEDSIM personnel.

This total number of query transactions was then distributed to individual sites to produce the "Total Transactions" column, which was then used to compute the number of "Internal Transactions" and "Public Transactions." The workloads of the State and District Offices are estimated to be 50 percent of the total transactions each. The workload of Area Offices is estimated to be split 75 percent by internal users and 25 percent by public users. These estimates were developed and confirmed at meetings between DSC and FEDSIM.

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Headquarters	0.10%	107	107	
Denver Service Center	0.20%	215	215	
Denver Service Center-Ext		26,831		
Arizona	3.74%	4,014		
Arizona State Office	36.00%	1,445	722	722
Arizona Strip DO	3.00%	120	60	60
*Vermilion RA	2.00%	80	60	20
Shivwits RA	2.00%	80	60	20
Dixie RA (Utah)[1]	1.00%	106	80	27
Colocation Total		267	200	67
*Phoenix DO	10.00%	401	201	201
Lower Gila RA	9.00%	361	271	90
Phoenix RA	11.00%	442	331	110
Colocation Total		1,204	803	401
Kingman RA	11.00%	442	331	110
*Safford DO	3.00%	120	60	60
San Simon RA	4.00%	161	120	40
Gila RA	3.00%	120	90	30
Colocation Total		401	271	130
*Yuma DO	2.00%	80	40	40
Yuma RA	2.00%	80	60	20
Colocation Total		161	100	60
Havasu RA	2.00%	80	60	20
Arizona Subtotal		4,120	2,548	1,572
California	5.66%	6,074		
California State Office	22.00%	1,336	668	668
Bakersfield DO	7.00%	425	213	213
Bishop RA	4.00%	243	182	61
Caliente RA	5.00%	304	228	76
Folsom RA	5.00%	304	228	76
Hollister RA	3.00%	182	137	46
Susanville DO	4.00%	243	121	121
Eagle Lake RA	1.00%	61	46	15
Cedarville RA	1.00%	61	46	15
Alturas RA	1.00%	61	46	15
*Ukiah DO	9.00%	547	273	273
Clear Lake RA	3.00%	182	137	46
Colocation Total		729	410	319
Arcata RA	3.00%	182	137	46
Redding RA	7.00%	425	319	106
California Desert DO	9.00%	547	273	273
El Centro RA	5.00%	304	228	76

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1 = Colocated in Arizona but included in Utah figures.

VOLUME OF INPUT TRANSACTIONS TO THE QUERY FUNCTION
FOR ALPHANUMERIC OUTPUT PER DAY FOR 1997

TABLE B-2

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Barstow RA	3.00%	182	137	46
Indio RA	2.00%	121	91	30
Needles RA	2.00%	121	91	30
Ridgecrest RA	4.00%	243	182	61
California Subtotal		6,074	3,781	2,293
Colorado	8.11%	8,704		
Colorado State Office	24.00%	2,089	1,044	1,044
Canon City DO	5.00%	435	218	218
Northeast RA	3.00%	261	196	65
San Luis RA	3.00%	261	196	65
Royal Gorge RA	4.00%	348	261	87
Craig DO	10.00%	870	435	435
Kremmling RA	2.00%	174	131	44
White River RA	7.00%	609	457	152
Little Snake RA	3.00%	261	196	65
*Grand Junction DO	8.00%	696	348	348
Grand Junction RA	4.00%	348	261	87
Colocation Total		1,044	609	435
Glenwood Springs RA	4.00%	348	261	87
*Montrose DO	7.00%	609	305	305
Uncompahgre Basin RA	4.00%	348	261	87
Colocation Total		957	566	392
Gunnison Basin RA	4.00%	348	261	87
San Juan RA	8.00%	696	522	174
Colorado Subtotal		8,704	5,353	3,351
Eastern States	6.61%	7,094		
Eastern States Office	64.00%	4,540	2,270	2,270
Jackson DO	18.00%	1,277	638	638
Milwaukee DO	17.00%	1,206	603	603
Rolla RA	1.00%	71	53	18
Eastern States Subtotal		7,094	3,565	3,529
Idaho	3.85%	4,132		
Idaho State Office	35.00%	1,446	723	723
*Boise DO	9.00%	372	186	186
Cascade RA	2.00%	83	62	21
Owyhee RA	4.00%	165	124	41
Bruneau RA	5.00%	207	155	52
Jarbidge RA	1.00%	41	31	10
Colocation Total		868	558	310

VOLUME OF INPUT TRANSACTIONS TO THE QUERY FUNCTION
FOR ALPHANUMERIC OUTPUT PER DAY FOR 1997

TABLE B-2 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
*Burley DO	2.00%	83	41	41
Deep Creek RA	2.00%	83	62	21
Snake River RA	2.00%	83	62	21
Colocation Total		248	165	83
*Coeur d'Alene DO	2.00%	83	41	41
Emerald Empire RA	2.00%	83	62	21
Colocation Total		165	103	62
Cottonwood RA	4.00%	165	124	41
*Idaho Falls DO	6.00%	248	124	124
Big Butte RA	3.00%	124	93	31
Medicine Lodge RA	1.00%	41	31	10
Colocation Total		413	248	165
Pocatello RA	7.00%	289	217	72
*Salmon DO	2.00%	83	41	41
Lemhi RA	2.00%	83	62	21
Challis RA	2.00%	83	62	21
Colocation Total		248	165	83
*Shoshone DO	2.00%	83	41	41
Monument RA	1.00%	41	31	10
Bennett Hills RA	4.00%	165	124	41
Colocation Total		289	196	93
Idaho Subtotal		4,132	2,500	1,632
Montana	12.22%	13,115		
Montana State Office	27.00%	3,541	1,770	1,770
*Butte DO	6.00%	787	393	393
Headwaters RA	2.00%	262	197	66
Colocation Total		1,049	590	459
Dillon RA	4.00%	525	393	131
Garnet RA	4.00%	525	393	131
Miles City DO	10.00%	1,311	656	656
*Big Dry RA	4.00%	525	393	131
Powder River RA	4.00%	525	393	131
Colocation Total		1,049	787	262
South Dakota RA	1.00%	131	98	33
Billings RA	5.00%	656	492	164
Dickinson DO	9.00%	1,180	590	590
*Lewistown DO	8.00%	1,049	525	525
Judith RA	3.00%	393	295	98
Colocation Total		1,443	820	623
Phillips RA	5.00%	656	492	164
Havre RA	1.00%	131	98	33
Valley RA	1.00%	131	98	33
Great Falls RA	6.00%	787	590	197

VOLUME OF INPUT TRANSACTIONS TO THE QUERY FUNCTION
FOR ALPHANUMERIC OUTPUT PER DAY FOR 1997

TABLE B-2 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Montana Subtotal		13,115	7,869	5,246
Nevada	7.92%	8,500		
Nevada State Office	27.00%	2,295	1,147	1,147
*Battle Mountain DO	4.00%	340	170	170
Shoshone-Eureka RA	2.00%	170	127	42
Colocation Total		510	297	212
Tonopah RA	5.00%	425	319	106
*Carson City DO	5.00%	425	212	212
Lahontan RA	5.00%	425	319	106
Walker RA	2.00%	170	127	42
Colocation Total		1,020	659	361
*Elko DO	3.00%	255	127	127
Elko RA	2.00%	170	127	42
Wells RA	2.00%	170	127	42
Colocation Total		595	382	212
*Ely DO	3.00%	255	127	127
Egan RA	2.00%	170	127	42
Schell RA	2.00%	170	127	42
Colocation Total		595	382	212
Las Vegas DO	12.00%	1,020	510	510
Stateline-Esmeralda RA	3.00%	255	191	64
Caliente RA	12.00%	1,020	765	255
*Winnemucca DO	2.00%	170	85	85
Paradise-Denio RA	2.00%	170	127	42
Sonoma-Gerlach RA	5.00%	425	319	106
Colocation Total		765	531	234
Nevada Subtotal		8,500	5,185	3,315
New Mexico	15.18%	16,292		
New Mexico State Office	27.00%	4,399	2,199	2,199
Albuquerque DO	14.00%	2,281	1,140	1,140
Rio Peuerco RA	6.00%	977	733	244
Farmington RA	11.00%	1,792	1,344	448
Taos RA	2.00%	326	244	81
*Las Cruces DO	5.00%	815	407	407
Las Cruces/Lordsburg RA	3.00%	489	367	122
White Sands RA	1.00%	163	122	41
Colocation Total		1,466	896	570
Socorro RA	2.00%	326	244	81
Tulsa DO	3.00%	489	244	244
Oklahoma RA	4.00%	652	489	163
Roswell DO	11.00%	1,792	896	896

VOLUME OF INPUT TRANSACTIONS TO THE QUERY FUNCTION
FOR ALPHANUMERIC OUTPUT PER DAY FOR 1997

TABLE B-2 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Roswell RA	6.00%	977	733	244
Carlsbad RA	5.00%	815	611	204
New Mexico Subtotal		16,292	9,775	6,517
Oregon	5.89%	6,321		
Oregon State Office	32.00%	2,023	1,011	1,011
*Burns DO	4.00%	253	126	126
Three Rivers RA	1.00%	63	47	16
Andrews RA	1.00%	63	47	16
Colocation Total		379	221	158
*Coos Bay DO	1.00%	63	32	32
Myrtlewood RA	1.00%	63	47	16
Tioga RA	1.00%	63	47	16
Umpqua RA	1.00%	63	47	16
Colocation Total		253	174	79
*Eugene DO	1.00%	63	32	32
Noti RA	1.00%	63	47	16
Dorena RA	1.00%	63	47	16
Mohawk RA	1.00%	63	47	16
Colocation Total		253	174	79
Lorane RA	1.00%	63	47	16
*Lakeview DO	4.00%	253	126	126
Warner Lake RA	1.00%	63	47	16
High Desert RA	1.00%	63	47	16
Colocation Total		379	221	158
Klamath Falls RA	1.00%	63	47	16
*Medford DO	6.00%	379	190	190
Klamath RA	1.00%	63	47	16
Butte Falls RA	1.00%	63	47	16
Jacksonville RA	1.00%	63	47	16
Grants Pass RA	1.00%	63	47	16
Glendale RA	1.00%	63	47	16
Colocation Total		695	427	269
*Prineville DO	5.00%	316	158	158
Central Oregon RA	1.00%	63	47	16
Deschutes RA	1.00%	63	47	16
Colocation Total		442	253	190
*Roseburg DO	1.00%	63	32	32
North Umpqua RA	1.00%	63	47	16
South Umpqua RA	1.00%	63	47	16
Dillard RA	1.00%	63	47	16
Drain RA	1.00%	63	47	16
Colocation Total		316	221	95
*Salem DO	2.00%	126	63	63

VOLUME OF INPUT TRANSACTIONS TO THE QUERY FUNCTION
FOR ALPHANUMERIC OUTPUT PER DAY FOR 1997

TABLE B-2 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Santiam RA	1.00%	63	47	16
Alsea RA	1.00%	63	47	16
Yamhill RA	1.00%	63	47	16
Clackamas RA	1.00%	63	47	16
Colocation Total		379	253	126
Tillamook RA	1.00%	63	47	16
*Spokane DO	6.00%	379	190	190
Border RA	1.00%	63	47	16
Colocation Total		442	237	205
Wenatchee RA	1.00%	63	47	16
*Vale DO	5.00%	316	158	158
N. Malheur RA	1.00%	63	47	16
S. Malheur RA	1.00%	63	47	16
Colocation Total		442	253	190
Baker RA	1.00%	63	47	16
Oregon Subtotal		6,321	3,682	2,639
Utah	9.88%	10,603		
Utah State Office	27.00%	2,863	1,431	1,431
*Salt Lake DO	3.00%	318	159	159
Bear River RA	3.00%	318	239	80
Pony Express RA	1.00%	106	80	27
Colocation Total		742	477	265
Cedar City DO	4.00%	424	212	212
Kanab RA	3.00%	318	239	80
Escalante RA	1.00%	106	80	27
Beaver River RA	3.00%	318	239	80
Richfield DO	5.00%	530	265	265
*Warm Springs RA	2.00%	212	159	53
House Range RA	1.00%	106	80	27
Colocation Total		318	239	80
Henry Mountain RA	1.00%	106	80	27
Sevier River RA	2.00%	212	159	53
Moab DO	9.00%	954	477	477
San Juan RA	6.00%	636	477	159
Grand RA	5.00%	530	398	133
*Price River RA	3.00%	318	239	80
San Rafael RA	6.00%	636	477	159
Colocation Total		954	716	239
*Vernal DO	6.00%	636	318	318
Diamond Mountain RA	4.00%	424	318	106
Book Cliffs RA	4.00%	424	318	106
Colocation Total		1,484	954	530

VOLUME OF INPUT TRANSACTIONS TO THE QUERY FUNCTION
FOR ALPHANUMERIC OUTPUT PER DAY FOR 1997

TABLE B-2 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Utah Subtotal		10,497	6,442	4,056
Wyoming	20.64%	22,151		
Wyoming State Office	23.00%	5,095	2,547	2,547
Casper DO	14.00%	3,101	1,551	1,551
Platte River RA	4.00%	886	665	222
Buffalo RA	4.00%	886	665	222
Newcastle RA	5.00%	1,108	831	277
Rawlins DO	10.00%	2,215	1,108	1,108
*Divide RA	3.00%	665	498	166
Medicine Bow RA	2.00%	443	332	111
Colocation Total		1,108	831	277
Lander RA	3.00%	665	498	166
Rock Springs DO	10.00%	2,215	1,108	1,108
*Big Sandy RA	2.00%	443	332	111
Salt Wells RA	4.00%	886	665	222
Colocation Total		1,329	997	332
Kemmerer RA	4.00%	886	665	222
Pinedale RA	2.00%	443	332	111
*Worland DO	6.00%	1,329	665	665
Grass Creek RA	1.00%	222	166	55
Washakie RA	1.00%	222	166	55
Colocation Total		1,772	997	775
Cody RA	2.00%	443	332	111
Wyoming Subtotal		22,151	13,125	9,027
TOTAL		134,153	64,146	43,176

VOLUME OF INPUT TRANSACTIONS TO THE QUERY FUNCTION
FOR ALPHANUMERIC OUTPUT PER DAY FOR 1997

TABLE B-2 (Continued)

B.3 Volume of Input to the Query Function for Graphic Output Per Day for 1997.

Table B-3, "Volume of Input to the Query Function for Graphic Output Per Day for 1997," shows the estimated volume of input transactions to the ALMRS Query functions in 1997. It shows the total number of transactions, internal transactions, and public transactions per day in 1997 for each BLM office. External transactions (transactions of agencies that are external to BLM) are shown by state on the row titled "(state name) Office-Ext."

The left column of this table lists each BLM office, grouped by state. The State, District, and Area offices are listed under each state, as explained for Table B-1.

The column titled "Percentage of Spread" shows the allocation of the input transactions to each state and to offices within that state. The same techniques and sources of information used to produce Table B-1 were used to produce Table B-3.

The column titled "Total Transactions" shows the estimated total volume of input transactions that produce graphics output, subtotaled by state. The column titled "Internal Transactions" shows the estimated volume of transactions conducted by BLM personnel in each of the BLM offices. The column titled "Public Transactions" shows the estimated volume of transactions conducted by the public in each of the BLM offices.

The data in this table were derived from Algorithm 8A - "Algorithm for Determining the Graphics Requirements in the Query Module" of the ALMRS "Requirements Document." The estimates were computed by multiplying the total transactions by 80 percent using the same rationale as used to produce Table B-2.

The "State Office-Ext" estimates were computed by multiplying the total transactions by the remaining 20 percent, which was further distributed to each State Office by multiplying the total transactions by the same percentages as were used to compute the number of internal public transactions.

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Headquarters	0.10%	54	54	
Denver Service Center	0.20%	107	107	
Arizona	3.74%	2,007		
Arizona State Office-Ext	3.74%	502	502	
Arizona State Office	36.00%	722	361	361
Arizona Strip DO	3.00%	60	30	30
*Vermillon RA	2.00%	40	30	10
Shivwits RA	2.00%	40	30	10
Dixie RA (Utah)[1]	1.00%	53	40	13
Colocation Total		133	100	33
*Phoenix DO	10.00%	201	100	100
Lower Gila RA	9.00%	181	135	45
Phoenix RA	11.00%	221	166	55
Colocation Total		602	401	201
Kingman RA	11.00%	221	166	55
*Safford DO	3.00%	60	30	30
San Simon RA	4.00%	80	60	20
Gila RA	3.00%	60	45	15
Colocation Total		201	135	65
*Yuma DO	2.00%	40	20	20
Yuma RA	2.00%	40	30	10
Colocation Total		80	50	30
Havasu RA	2.00%	40	30	10
Arizona Subtotal		2,562	1,776	786
California	5.66%	3,037		
California State Office-Ext	5.66%	759	759	
California State Office	22.00%	668	334	334
Bakersfield DO	7.00%	213	106	106
Bishop RA	4.00%	121	91	30
Caliente RA	5.00%	152	114	38
Folsom RA	5.00%	152	114	38
Hollister RA	3.00%	91	68	23
Susanville DO	4.00%	121	61	61
Eagle Lake RA	1.00%	30	23	8
Cedarville RA	1.00%	30	23	8
Alturas RA	1.00%	30	23	8
*Ukiah DO	9.00%	273	137	137
Clear Lake RA	3.00%	91	68	23
Colocation Total		364	205	159
Arcata RA	3.00%	91	68	23
Redding RA	7.00%	213	159	53
California Desert DO	9.00%	273	137	137

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1 = Colocated in Arizona but included in Utah figures.

VOLUME OF INPUT TRANSACTIONS TO THE QUERY FUNCTION
FOR GRAPHIC OUTPUT PER DAY FOR 1997

TABLE B-3

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
El Centro RA	5.00%	152	114	38
Barstow RA	3.00%	91	68	23
Indio RA	2.00%	61	46	15
Needles RA	2.00%	61	46	15
Ridgecrest RA	4.00%	121	91	30
California Subtotal		3,797	2,650	1,147
Colorado	8.11%	4,352		
Colorado State Office-Ext	8.11%	1,088	1,088	
Colorado State Office	24.00%	1,044	522	522
Canon City DO	5.00%	218	109	109
Northeast RA	3.00%	131	98	33
San Luis RA	3.00%	131	98	33
Royal Gorge RA	4.00%	174	131	44
Craig DO	10.00%	435	218	218
Kremmling RA	2.00%	87	65	22
White River RA	7.00%	305	228	76
Little Snake RA	3.00%	131	98	33
*Grand Junction DO	8.00%	348	174	174
Grand Junction RA	4.00%	174	131	44
Colocation Total		522	305	218
Glenwood Springs RA	4.00%	174	131	44
*Montrose DO	7.00%	305	152	152
Uncompahgre Basin RA	4.00%	174	131	44
Colocation Total		479	283	196
Gunnison Basin RA	4.00%	174	131	44
San Juan RA	8.00%	348	261	87
Colorado Subtotal		5,440	3,764	1,675
Eastern States	6.61%	3,547		
Eastern States Office-Ext	6.61%	887	887	
Eastern States Office	64.00%	2,270	1,135	1,135
Jackson DO	18.00%	638	319	319
Milwaukee DO	17.00%	603	301	301
Rolla RA	1.00%	35	27	9
Eastern States Subtotal		4,434	2,669	1,765
Idaho	3.85%	2,066		
Idaho State Office-Ext	3.85%	516	516	
Idaho State Office	35.00%	723	362	362
*Boise DO	9.00%	186	93	93
Cascade RA	2.00%	41	31	10

VOLUME OF INPUT TRANSACTIONS TO THE QUERY FUNCTION
FOR GRAPHIC OUTPUT PER DAY FOR 1997

TABLE B-3 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Owyhee RA	4.00%	83	62	21
Bruneau RA	5.00%	103	77	26
Jarbidge RA	1.00%	21	15	5
Colocation Total		434	279	155
*Burley DO	2.00%	41	21	21
Deep Creek RA	2.00%	41	31	10
Snake River RA	2.00%	41	31	10
Colocation Total		124	83	41
*Coeur d'Alene DO	2.00%	41	21	21
Emerald Empire RA	2.00%	41	31	10
Colocation Total		83	52	31
Cottonwood RA	4.00%	83	62	21
*Idaho Falls DO	6.00%	124	62	62
Big Butte RA	3.00%	62	46	15
Medicine Lodge RA	1.00%	21	15	5
Colocation Total		207	124	83
Pocatello RA	7.00%	145	108	36
*Salmon DO	2.00%	41	21	21
Lemhi RA	2.00%	41	31	10
Challis RA	2.00%	41	31	10
Colocation Total		124	83	41
*Shoshone DO	2.00%	41	21	21
Monument RA	1.00%	21	15	5
Bennett Hills RA	4.00%	83	62	21
Colocation Total		145	98	46
Idaho Subtotal		2,582	1,766	816
Montana	12.22%	6,557		
Montana State Office-Ext	12.22%	1,639	1,639	
Montana State Office	27.00%	1,770	885	885
*Butte DO	6.00%	393	197	197
Headwaters RA	2.00%	131	98	33
Colocation Total		525	295	230
Dillon RA	4.00%	262	197	66
Garnet RA	4.00%	262	197	66
Miles City DO	10.00%	656	328	328
*Big Dry RA	4.00%	262	197	66
Powder River RA	4.00%	262	197	66
Colocation Total		525	393	131
South Dakota RA	1.00%	66	49	16
Billings RA	5.00%	328	246	82
Dickinson DO	9.00%	590	295	295
*Lewistown DO	8.00%	525	262	262
Judith RA	3.00%	197	148	49

VOLUME OF INPUT TRANSACTIONS TO THE QUERY FUNCTION
FOR GRAPHIC OUTPUT PER DAY FOR 1997

TABLE B-3 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Colocation Total		721	410	311
Phillips RA	5.00%	328	246	82
Havre RA	1.00%	66	49	16
Valley RA	1.00%	66	49	16
Great Falls RA	6.00%	393	295	98
Montana Subtotal		8,197	5,574	2,623
Nevada	7.92%	4,250		
Nevada State Office-Ext	7.92%	1,062	1,062	
Nevada State Office	27.00%	1,147	574	574
*Battle Mountain DO	4.00%	170	85	85
Shoshone-Eureka RA	2.00%	85	64	21
Colocation Total		255	149	106
Tonopah RA	5.00%	212	159	53
*Carson City DO	5.00%	212	106	106
Lahontan RA	5.00%	212	159	53
Walker RA	2.00%	85	64	21
Colocation Total		510	329	181
*Elko DO	3.00%	127	64	64
Elko RA	2.00%	85	64	21
Wells RA	2.00%	85	64	21
Colocation Total		297	191	106
*Ely DO	3.00%	127	64	64
Egan RA	2.00%	85	64	21
Schell RA	2.00%	85	64	21
Colocation Total		297	191	106
Las Vegas DO	12.00%	510	255	255
Stateline-Esmeralda RA	3.00%	127	96	32
Caliente RA	12.00%	510	382	127
*Winnemucca DO	2.00%	85	42	42
Paradise-Denio RA	2.00%	85	64	21
Sonoma-Gerlach RA	5.00%	212	159	53
Colocation Total		382	266	117
Nevada Subtotal		5,312	3,655	1,657
New Mexico	15.18%	8,146		
New Mexico State Office-Ext	15.18%	2,036	2,036	
New Mexico State Office	27.00%	2,199	1,100	1,100
Albuquerque DO	14.00%	1,140	570	570
Rio Peuerco RA	6.00%	489	367	122
Farmington RA	11.00%	896	672	224
Taos RA	2.00%	163	122	41
*Las Cruces DO	5.00%	407	204	204

VOLUME OF INPUT TRANSACTIONS TO THE QUERY FUNCTION
FOR GRAPHIC OUTPUT PER DAY FOR 1997

TABLE B-3 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Las Cruces/Lordsburg RA	3.00%	244	183	61
White Sands RA	1.00%	81	61	20
Colocation Total		733	448	285
Socorro RA	2.00%	163	122	41
Tulsa DO	3.00%	244	122	122
Oklahoma RA	4.00%	326	244	81
Roswell DO	11.00%	896	448	448
Roswell RA	6.00%	489	367	122
Carlsbad RA	5.00%	407	305	102
New Mexico Subtotal		10,182	6,924	3,258
Oregon	5.89%	3,161		
Oregon State Office-Ext	5.89%	790	790	
Oregon State Office	32.00%	1,011	506	506
*Burns DO	4.00%	126	63	63
Three Rivers RA	1.00%	32	24	8
Andrews RA	1.00%	32	24	8
Colocation Total		190	111	79
*Coos Bay DO	1.00%	32	16	16
Myrtlewood RA	1.00%	32	24	8
Tioga RA	1.00%	32	24	8
Umpqua RA	1.00%	32	24	8
Colocation Total		126	87	40
*Eugene DO	1.00%	32	16	16
Noti RA	1.00%	32	24	8
Dorena RA	1.00%	32	24	8
Mohawk RA	1.00%	32	24	8
Colocation Total		126	87	40
Lorane RA	1.00%	32	24	8
*Lakeview DO	4.00%	126	63	63
Warner Lake RA	1.00%	32	24	8
High Desert RA	1.00%	32	24	8
Colocation Total		190	111	79
Klamath Falls RA	1.00%	32	24	8
*Medford DO	6.00%	190	95	95
Klamath RA	1.00%	32	24	8
Butte Falls RA	1.00%	32	24	8
Jacksonville RA	1.00%	32	24	8
Grants Pass RA	1.00%	32	24	8
Glendale RA	1.00%	32	24	8
Colocation Total		348	213	134
*Prineville DO	5.00%	158	79	79
Central Oregon RA	1.00%	32	24	8
Deschutes RA	1.00%	32	24	8

VOLUME OF INPUT TRANSACTIONS TO THE QUERY FUNCTION
FOR GRAPHIC OUTPUT PER DAY FOR 1997

TABLE B-3 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Colocation Total		221	126	95
*Roseburg DO	1.00%	32	16	16
North Umpqua RA	1.00%	32	24	8
South Umpqua RA	1.00%	32	24	8
Dillard RA	1.00%	32	24	8
Drain RA	1.00%	32	24	8
Colocation Total		158	111	47
*Salem DO	2.00%	63	32	32
Santiam RA	1.00%	32	24	8
Alsea RA	1.00%	32	24	8
Yamhill RA	1.00%	32	24	8
Clackamas RA	1.00%	32	24	8
Colocation Total		190	126	63
Tillamook RA	1.00%	32	24	8
*Spokane DO	6.00%	190	95	95
Border RA	1.00%	32	24	8
Colocation Total		221	119	103
Wenatchee RA	1.00%	32	24	8
*Vale DO	5.00%	158	79	79
N. Malheur RA	1.00%	32	24	8
S. Malheur RA	1.00%	32	24	8
Colocation Total		221	126	95
Baker RA	1.00%	32	24	8
Oregon Subtotal		3,951	2,631	1,320
Utah	9.88%	5,302		
Utah State Office-Ext	9.88%	1,325	1,325	
Utah State Office	27.00%	1,431	716	716
*Salt Lake DO	3.00%	159	80	80
Bear River RA	3.00%	159	119	40
Pony Express RA	1.00%	53	40	13
Colocation Total		371	239	133
Cedar City DO	4.00%	212	106	106
Kanab RA	3.00%	159	119	40
Escalante RA	1.00%	53	40	13
Beaver River RA	3.00%	159	119	40
Richfield DO	5.00%	265	133	133
*Warm Springs RA	2.00%	106	80	27
House Range RA	1.00%	53	40	13
Colocation Total		159	119	40
Henry Mountain RA	1.00%	53	40	13
Sevier River RA	2.00%	106	80	27
Moab DO	9.00%	477	239	239
San Juan RA	6.00%	318	239	80

VOLUME OF INPUT TRANSACTIONS TO THE QUERY FUNCTION
FOR GRAPHIC OUTPUT PER DAY FOR 1997

TABLE B-3 (Continued)

OFFICES	PERCENTAGE SPREAD	TOTAL TRANS-ACTIONS	INTERNAL TRANS-ACTIONS	PUBLIC TRANS-ACTIONS
Grand RA	5.00%	265	199	66
*Price River RA	3.00%	159	119	40
San Rafael RA	6.00%	318	239	80
Colocation Total		477	358	119
*Vernal DO	6.00%	318	159	159
Diamond Mountain RA	4.00%	212	159	53
Book Cliffs RA	4.00%	212	159	53
Colocation Total		742	477	265
Utah Subtotal		6,574	4,546	2,028
Wyoming	20.64%	11,076		
Wyoming State Office-Ext	20.94%	2,809	2,809	
Wyoming State Office	23.00%	2,547	1,274	1,274
Casper DO	14.00%	1,551	775	775
Platte River RA	4.00%	443	332	111
Buffalo RA	4.00%	443	332	111
Newcastle RA	5.00%	554	415	138
Rawlins DO	10.00%	1,108	554	554
*Divide RA	3.00%	332	249	83
Medicine Bow RA	2.00%	222	166	55
Colocation Total		554	415	138
Lander RA	3.00%	332	249	83
Rock Springs DO	10.00%	1,108	554	554
*Big Sandy RA	2.00%	222	166	55
Salt Wells RA	4.00%	443	332	111
Colocation Total		665	498	166
Kemmerer RA	4.00%	443	332	111
Pinedale RA	2.00%	222	166	55
*Worland DO	6.00%	665	332	332
Grass Creek RA	1.00%	111	83	28
Washakie RA	1.00%	111	83	28
Colocation Total		886	498	388
Cody RA	2.00%	222	166	55
Wyoming Subtotal		13,885	9,372	4,513
TOTAL		67,077	45,488	21,588

VOLUME OF INPUT TRANSACTIONS TO THE QUERY FUNCTION
FOR GRAPHIC OUTPUT PER DAY FOR 1997

TABLE B-3 (Continued)

B.4 Volume of Alphanumeric Automated Storage in Millions of Characters by Location for 1997.

Table B-4, "Volume of Alphanumeric Automated Storage in Millions of Characters by Location for 1997," shows the estimates of the volume of storage required for ALMRS alphanumeric data for the year 1997. It shows the total storage, variable files storage, and constant files storage requiremetns of each BLM office.

The left column of this table lists each BLM office, grouped by state. The State, District, and Area offices are listed under each state, as explained for Table B-1.

The column titled "Percentage of Spread" shows the allocation of the input transactions to each state and to offices within that state. The same techniques and sources of information used to produce Table B-1 were used to produce Table B-4.

The column titled "Variable Storage" shows estimates of the total size of the variable files, which are: the Ownership and Status File, the Land Description File, and Stipulations File. These estimates were computed by multiplying the total size of the variable files by the percentage allocated to the site. The column titled "Constant Storage" shows estimates of the storage required to the Regulation Reference File and the Master Name File. Copies of he entire Master Name File will be maintained at each location. The Regulation Reference File will be maintained at DSC and accessed from other locations via telecommunications lines. The "Total Storage" column is the sum of the variable and constant columns and represents the total alphanumeric data storage requirements of each BLM office.

The data used to produce this table were derived from two sources: the ALMRS "Requirements Document" and a DSC memorandum. The storage estimates for the Ownership and Status File, Land Description File, Stipulations File, and Regulation Reference Files were obtained from the ALMRS "Requirements Document" (page 31) Algorithm 10 - "ALMRS Alphanumeric Storage Requirements." The storage estimates for the Master Name File was obtained from the memorandum under the subsection "Additions to ALMRS Automated Files."

OFFICES	PERCENTAGE SPREAD	VARIABLE (CHARACTERS x MILLIONS)	CONSTANT (CHARACTERS x MILLIONS)	TOTAL (CHARACTERS x MILLIONS)
Denver Service Center		20,690	1,560	22,250
Arizona		3,513	4,480	7,993
Arizona State Office		1,548	560	2,108
Arizona Strip DO	8.00%	124	560	684
*Vermillon RA	65.00%	81		
Shivwits RA	35.00%	43		
Dixie RA (Utah)[1]	15.00%	35		
Colocation Total		159	560	719
*Phoenix DO	72.00%	1,115		
Lower Gila RA	22.00%	0		
Phoenix RA	57.00%	0		
Colocation Total		1,115	560	1,675
Kingman RA	21.00%	234	560	794
*Safford DO	15.00%	232		
San Simon RA	60.00%	0		
Gila RA	40.00%	0		
Colocation Total		232	560	792
*Yuma DO	5.00%	78		
Yuma RA	70.00%	0		
Colocation Total		78	560	638
Havasu RA	30.00%	23	560	583
California		6,325	10,640	16,965
California State Office		2,155	560	2,715
Bakersfield DO	35.00%	755	560	1,315
Bishop RA	8.00%	60	560	620
Caliente RA	32.00%	241	560	801
Folsom RA	35.00%	264	560	824
Hollister RA	25.00%	189	560	749
Susanville DO	8.00%	173	560	733
Eagle Lake RA	45.00%	78	560	638
Cedarville RA	25.00%	43	560	603
Alturas RA	30.00%	52	560	612
*Ukiah DO	22.00%	474		
Clear Lake RA	30.00%	0		
Colocation Total		474	560	1,034
Arcata RA	25.00%	119	560	679
Redding RA	45.00%	213	560	773
California Desert DO	35.00%	755	560	1,315
El Centro RA	10.00%	75	560	635
Barstow RA	40.00%	302	560	862
Indio RA	10.00%	75	560	635
Needles RA	20.00%	151	560	711

1 = Colocated in Arizona but included in Utah figures.

VOLUME OF ALPHANUMERIC AUTOMATED STORAGE IN MILLIONS
OF CHARACTERS BY LOCATION FOR 1997

TABLE B-4

OFFICES	PERCENTAGE SPREAD	VARIABLE (CHARACTERS x MILLIONS)	CONSTANT (CHARACTERS x MILLIONS)	TOTAL (CHARACTERS x MILLIONS)
Ridgecrest RA	20.00%	151	560	711
Colorado		4,741	7,840	12,581
Colorado State Office		1,606	560	2,166
Canon City DO	78.00%	1,253	560	1,813
Northeast RA	75.00%	940	560	1,500
San Luis RA	6.00%	75	560	635
Royal Gorge RA	19.00%	238	560	798
Craig DO	9.00%	145	560	705
Kremmling RA	30.00%	43	560	603
White River RA	30.00%	43	560	603
Little Snake RA	40.00%	58	560	618
*Grand Junction DO	4.00%	64		
Grand Junction RA	50.00%	0		
Colocation Total		64	560	624
Glenwood Springs RA	50.00%	32	560	592
*Montrose DO	9.00%	145		
Uncompahgre Basin RA	32.00%	0		
Colocation Total		145	560	705
Gunnison Basin RA	28.00%	41	560	601
San Juan RA	40.00%	58	560	618
Eastern States		6,613	2,240	8,853
Eastern States Office		3,306	560	3,866
Jackson DO	44.00%	1,455	560	2,015
Milwaukee DO	55.00%	1,819	560	2,379
Rolla RA	1.00%	33	560	593
Idaho		2,484	5,040	7,524
Idaho State Office		1,135	560	1,695
*Boise DO	24.00%	273		
Cascade RA	45.00%	0		
Owyhee RA	18.00%	0		
Bruneau RA	20.00%	0		
Jarbidge RA	17.00%	0		
Colocation Total		273	560	833
*Burley DO	10.00%	114		
Deep Creek RA	40.00%	0		
Snake River RA	60.00%	0		
Colocation Total		114	560	674
*Coeur d'Alene DO	24.00%	273		
Emerald Empire RA	40.00%	0		
Colocation Total		273	560	833
Cottonwood RA	60.00%	164	560	724

VOLUME OF ALPHANUMERIC AUTOMATED STORAGE IN MILLIONS
OF CHARACTERS BY LOCATION FOR 1997

TABLE B-4 (Continued)

OFFICES	PERCENTAGE SPREAD	VARIABLE (CHARACTERS x MILLIONS)	CONSTANT (CHARACTERS x MILLIONS)	TOTAL (CHARACTERS x MILLIONS)
*Idaho Falls DO	18.00%	204		
Big Butte RA	30.00%	0		
Medicine Lodge RA	40.00%	0		
Colocation Total		204	560	764
Pocatello RA	30.00%	61	560	621
*Salmon DO	15.00%	170		
Lemhi RA	22.00%	0		
Challis RA	78.00%	0		
Colocation Total		170	560	730
*Shoshone DO	8.00%	91		
Monument RA	52.00%	0		
Bennett Hills RA	48.00%	0		
Colocation Total		91	560	651
Montana		7,787	7,840	15,627
Montana State Office		2,924	560	3,484
*Butte DO	17.00%	497		
Headwaters RA	30.00%	0		
Colocation Total		497	560	1,057
Dillon RA	20.00%	99	560	659
Garnet RA	50.00%	249	560	809
Miles City DO	46.00%	1,345	560	1,905
*Big Dry RA	22.00%	296		
Powder River RA	10.00%	135		
Colocation Total		431	560	991
South Dakota RA	56.00%	753	560	1,313
Billings RA	12.00%	161	560	721
Dickinson DO	24.00%	702	560	1,262
*Lewistown DO	12.00%	351		
Judith RA	22.00%	0		
Colocation Total		351	560	911
Phillips RA	12.00%	42	560	602
Havre RA	21.00%	74	560	634
Valley RA	10.00%	35	560	595
Great Falls RA	35.00%	123	560	683
Nevada		3,468	5,600	9,068
Nevada State Office		1,501	560	2,061
*Battle Mountain DO	20.00%	300		
Shoshone-Eureka RA	45.00%	0		
Colocation Total		300	560	860
Tonopah RA	55.00%	165	560	725
*Carson City DO	15.00%	225		
Lahontan RA	55.00%	0		
Walker RA	45.00%	0		

VOLUME OF ALPHANUMERIC AUTOMATED STORAGE IN MILLIONS OF CHARACTERS BY LOCATION FOR 1997

TABLE B-4 (Continued)

OFFICES	PERCENTAGE SPREAD	VARIABLE (CHARACTERS x MILLIONS)	CONSTANT (CHARACTERS x MILLIONS)	TOTAL (CHARACTERS x MILLIONS)
Colocation Total		225	560	785
*Elko DO	15.00%	225		
Elko RA	50.00%	0		
Wells RA	50.00%	0		
Colocation Total		225	560	785
*Ely DO	15.00%	225		
Egan RA	50.00%	0		
Schell RA	50.00%	0		
Colocation Total		225	560	785
Las Vegas DO	20.00%	300	560	860
Stateline-Esmeralda RA	55.00%	165	560	725
Caliente RA	45.00%	135	560	695
*Winnemucca DO	15.00%	225		
Paradise-Denio RA	45.00%	0		
Sonoma-Gerlach RA	55.00%	0		
Colocation Total		225	560	785
New Mexico		5,453	6,720	12,173
New Mexico State Office		1,881	560	2,441
Albuquerque DO	11.00%	207	560	767
Rio Peuerco RA	27.00%	56	560	616
Farmington RA	27.00%	56	560	616
Taos RA	46.00%	95	560	655
*Las Cruces DO	13.00%	245		
Las Cruces/Lordsburg RA	23.00%	0		
White Sands RA	55.00%	0		
Colocation Total		245	560	805
Socorro RA	22.00%	54	560	614
Tulsa DO	43.00%	809	560	1,369
Oklahoma RA	100.00%	809	560	1,369
Roswell DO	33.00%	621	560	1,181
Roswell RA	15.00%	93	560	653
Carlsbad RA	85.00%	528	560	1,088
Oregon		4,602	8,960	13,562
Oregon State Office		1,973	560	2,533
*Burns DO	9.00%	178		
Three Rivers RA	70.00%	0		
Andrews RA	30.00%	0		
Colocation Total		178	560	738
*Coos Bay DO	3.00%	59		
Myrtlewood RA	50.00%	0		
Tioga RA	25.00%	0		
Umpqua RA	25.00%	0		
Colocation Total		59	560	619

VOLUME OF ALPHANUMERIC AUTOMATED STORAGE IN MILLIONS
OF CHARACTERS BY LOCATION FOR 1997

TABLE B-4 (Continued)

OFFICES	PERCENTAGE SPREAD	VARIABLE (CHARACTERS x MILLIONS)	CONSTANT (CHARACTERS x MILLIONS)	TOTAL (CHARACTERS x MILLIONS)
*Eugene DO	3.00%	59		
Noti RA	15.00%	0		
Dorena RA	15.00%	0		
Mohawk RA	40.00%	0		
Colocation Total		59	560	619
Lorane RA	30.00%	18	560	578
*Lakeview DO	9.00%	178		
Warner Lake RA	30.00%	0		
High Desert RA	30.00%	0		
Colocation Total		178	560	738
Klamath Falls RA	40.00%	71	560	631
*Medford DO	3.00%	59		
Klamath RA	25.00%	0		
Butte Falls RA	20.00%	0		
Jacksonville RA	15.00%	0		
Grants Pass RA	30.00%	0		
Glendale RA	10.00%	0		
Colocation Total		59	560	619
*Prineville DO	9.00%	178		
Central Oregon RA	40.00%	0		
Deschutes RA	60.00%	0		
Colocation Total		178	560	738
*Roseburg DO	2.00%	40		
North Umpqua RA	55.00%	0		
South Umpqua RA	20.00%	0		
Dillard RA	10.00%	0		
Drain RA	15.00%	0		
Colocation Total		40	560	600
*Salem DO	6.00%	119		
Santiam RA	15.00%	0		
Alsea RA	20.00%	0		
Yamhill RA	22.00%	0		
Clackamas RA	20.00%	0		
Colocation Total		119	560	679
Tillamook RA	23.00%	27	560	587
*Spokane DO	41.00%	809		
Border RA	50.00%	0		
Colocation Total		809	560	1,369
Wenatchee RA	50.00%	405	560	965
*Vale DO	15.00%	296		
N. Malheur RA	25.00%	0		
S. Malheur RA	30.00%	0		
Colocation Total		296	560	856
Baker RA	45.00%	133	560	693

VOLUME OF ALPHANUMERIC AUTOMATED STORAGE IN MILLIONS
OF CHARACTERS BY LOCATION FOR 1997

TABLE B-4 (Continued)

OFFICES	PERCENTAGE SPREAD	VARIABLE (CHARACTERS x MILLIONS)	CONSTANT (CHARACTERS x MILLIONS)	TOTAL (CHARACTERS x MILLIONS)
Utah		3,000	8,400	11,400
Utah State Office		1,153	560	1,713
*Salt Lake DO	27.00%	312		
Bear River RA	60.00%	0		
Pony Express RA	40.00%	0		
Colocation Total		312	560	872
Cedar City DO	20.00%	231	560	791
Kanab RA	30.00%	69	560	629
Escalante RA	20.00%	46	560	606
Beaver River RA	35.00%	81	560	641
Richfield DO	20.00%	231	560	791
*Warm Springs RA	24.00%	55		
House Range RA	25.00%	58		
Colocation Total		113	560	673
Henry Mountain RA	23.00%	53	560	613
Sevier River RA	28.00%	65	560	625
Moab DO	23.00%	265	560	825
San Juan RA	35.00%	93	560	653
Grand RA	30.00%	80	560	640
*Price River RA	17.00%	45		
San Rafael RA	18.00%	48		
Colocation Total		93	560	653
*Vernal DO	10.00%	115		
Diamond Mountain RA	65.00%	0		
Book Cliffs RA	35.00%	0		
Colocation Total		115	560	675
Wyoming		4,485	7,840	12,325
Wyoming State Office		1,509	560	2,069
Casper DO	65.00%	981	560	1,541
Platte River RA	15.00%	147	560	707
Buffalo RA	10.00%	98	560	658
Newcastle RA	75.00%	736	560	1,296
Rawlins DO	18.00%	272	560	832
*Divide RA	20.00%	54		
Medicine Bow RA	43.00%	117		
Colocation Total		171	560	731
Lander RA	37.00%	101	560	661
Rock Springs DO	10.00%	151	560	711
*Big Sandy RA	22.00%	33		
Salt Wells RA	20.00%	30		
Colocation Total		63	560	623
Kemmerer RA	26.00%	39	560	599
Pinedale RA	32.00%	48	560	608
*Worland DO	7.00%	106		

VOLUME OF ALPHANUMERIC AUTOMATED STORAGE IN MILLIONS OF CHARACTERS BY LOCATION FOR 1997

TABLE B-4 (Continued)

OFFICES	PERCENTAGE SPREAD	VARIABLE (CHARACTERS x MILLIONS)	CONSTANT (CHARACTERS x MILLIONS)	TOTAL (CHARACTERS x MILLIONS)
Grass Creek RA	22.00%	0		
Washakie RA	18.00%	0		
Colocation Total		106	560	666
Cody RA	60.00%	63	560	623
TOTAL		73,161	77,160	150,321

VOLUME OF ALPHANUMERIC AUTOMATED STORAGE IN MILLIONS
OF CHARACTERS BY LOCATION FOR 1997

TABLE B-4 (Continued)

B.5 Volume of Graphic Automated Storage in Millions of Characters by Location for 1997.

Table B-5 "Volume of Graphic Automated Storage in Millions of Characters by Location for 1997" shows the estimes of the storage required for ALMRS graphic data in the year 1997. It shows the total storage requirements, requirements for storage of prestructured graphic data, and requirements for storage of unstructured graphic data.

The left column of this table lists each BLM office, grouped by state. The State, District, and Area offices are listed under each state, as explained for Table B-1.

The column titled "Percentage of Spread" shows the allocation of the input transactions to each state and to offices within that state. The same techniques and sources of information used to produce Table B-1 were used to produce Table B-5.

The column titled "Prestructured" shows the amount of data storage required by each BLM office for storing prestructured graphics data. The column titled "Unstructured" shows the amount of data storage required by each BLM office for storing unstructured graphics data.

The estimates were extracted from a DSC memorandum. The total volume of prestructured graphic data storage was computed using information contained in that memorandum's table entitled, "Information Requirements to Produce Spatial Graphics Using Prestructured Concept." The total volume of unstructured graphic data storage was computed using information contained in that memorandum's table entitled, "Information Requirements to Produce Spatial Graphics Using ALMRS Unstructured Data Concept." Estimates for each site within the state were computed by multiplying the percentages found in the "Percentage of Spread" column by the estimates of prestructured and unstructured graphic storage of the state.

OFFICES	PERCENTAGE SPREAD	PRESTRUCTURED (CHARACTERS x MILLIONS)	UNSTRUCTURED (CHARACTERS x MILLIONS)
Arizona		69,551	25,440
Arizona State Office	7.30%	30,650	11,211
Arizona Strip DO	8.00%	2,452	897
*Vermillon RA	65.00%	1,594	583
Shivwits RA	35.00%	858	314
Dixie RA (Utah)[1]	15.00%	705	258
Colocation Total		3,157	1,155
*Phoenix DO	72.00%	22,068	8,072
Lower Gila RA	22.00%	0	0
Phoenix RA	57.00%	0	0
Colocation Total		22,068	8,072
Kingman RA	21.00%	4,634	1,695
*Safford DO	15.00%	4,597	1,682
San Simon RA	60.00%	0	0
Gila RA	40.00%	0	0
Colocation Total		4,597	1,682
*Yuma DO	5.00%	1,532	561
Yuma RA	70.00%	0	0
Colocation Total		1,532	561
Havasu RA	30.00%	460	168
California		123,187	45,058
California State Office	10.00%	41,986	15,357
Bakersfield DO	35.00%	14,695	5,375
Bishop RA	8.00%	1,176	430
Caliente RA	32.00%	4,702	1,720
Folsom RA	35.00%	5,143	1,881
Hollister RA	25.00%	3,674	1,344
Susanville DO	8.00%	3,359	1,229
Eagle Lake RA	45.00%	1,511	553
Cedarville RA	25.00%	840	307
Alturas RA	30.00%	1,008	369
*Ukiah DO	22.00%	9,237	3,379
Clear Lake RA	30.00%	0	0
Colocation Total		9,237	3,379
Arcata RA	25.00%	2,309	845
Redding RA	45.00%	4,157	1,520
California Desert DO	35.00%	14,695	5,375
El Centro RA	10.00%	1,470	538
Barstow RA	40.00%	5,878	2,150
Indio RA	10.00%	1,470	538
Needles RA	20.00%	2,939	1,075

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1 = Colocated in Arizona but included in Utah figures.

VOLUME OF GRAPHIC AUTOMATED STORAGE IN MILLIONS OF CHARACTERS BY LOCATION FOR 1997

TABLE B-5

OFFICES	PERCENTAGE SPREAD	PRESTRUCTURED (CHARACTERS x MILLIONS)	UNSTRUCTURED (CHARACTERS x MILLIONS)
Ridgecrest RA	20.00%	2,939	1,075
Colorado		96,649	35,351
Colorado State Office	7.80%	32,749	11,979
Canon City DO	78.00%	25,544	9,343
Northeast RA	75.00%	19,158	7,007
San Luis RA	6.00%	1,533	561
Royal Gorge RA	19.00%	4,853	1,775
Craig DO	9.00%	2,947	1,078
Kremmling RA	30.00%	884	323
White River RA	30.00%	884	323
Little Snake RA	40.00%	1,179	431
*Grand Junction DO	4.00%	1,310	479
Grand Junction RA	50.00%	0	0
Colocation Total		1,310	479
Glenwood Springs RA	50.00%	655	240
*Montrose DO	9.00%	2,947	1,078
Uncompahgre Basin RA	32.00%	0	0
Colocation Total		2,947	1,078
Gunnison Basin RA	28.00%	825	302
San Juan RA	40.00%	1,179	431
Eastern States		141,073	51,600
Eastern States Office	16.80%	70,536	25,800
Jackson DO	44.00%	31,036	11,352
Milwaukee DO	55.00%	38,795	14,190
Rolla RA	1.00%	705	258
Idaho		51,445	18,817
Idaho State Office	5.60%	23,512	8,600
*Boise DO	24.00%	5,643	2,064
Cascade RA	45.00%	0	0
Owyhee RA	18.00%	0	0
Bruneau RA	20.00%	0	0
Jarbidge RA	17.00%	0	0
Colocation Total		5,643	2,064
*Burley DO	10.00%	2,351	860
Deep Creek RA	40.00%	0	0
Snake River RA	60.00%	0	0
Colocation Total		2,351	860
*Coeur d'Alene DO	24.00%	5,643	2,064
Emerald Empire RA	40.00%	0	0
Colocation Total		5,643	2,064
Cottonwood RA	60.00%	3,386	1,238

VOLUME OF GRAPHIC AUTOMATED STORAGE IN MILLIONS
OF CHARACTERS BY LOCATION FOR 1997

TABLE B-5 (Continued)

OFFICES	PERCENTAGE SPREAD	PRESTRUCTURED (CHARACTERS x MILLIONS)	UNSTRUCTURED (CHARACTERS x MILLIONS)
*Idaho Falls DO	18.00%	4,232	1,548
Big Butte RA	30.00%	0	0
Medicine Lodge RA	40.00%	0	0
Colocation Total		4,232	1,548
Pocatello RA	30.00%	1,270	464
*Salmon DO	15.00%	3,527	1,290
Lemhi RA	22.00%	0	0
Challis RA	78.00%	0	0
Colocation Total		3,527	1,290
*Shoshone DO	8.00%	1,881	688
Monument RA	52.00%	0	0
Bennett Hills RA	48.00%	0	0
Colocation Total		1,881	688
Montana		146,447	53,566
Montana State Office	13.10%	55,002	20,118
*Butte DO	17.00%	9,350	3,420
Headwaters RA	30.00%	0	0
Colocation Total		9,350	3,420
Dillon RA	20.00%	1,870	684
Garnet RA	50.00%	4,675	1,710
Miles City DO	46.00%	25,301	9,254
*Big Dry RA	22.00%	5,566	2,036
Powder River RA	10.00%	2,530	925
Colocation Total		8,096	2,961
South Dakota RA	56.00%	14,168	5,182
Billings RA	12.00%	3,036	1,111
Dickinson DO	24.00%	13,200	4,828
*Lewistown DO	12.00%	6,600	2,414
Judith RA	22.00%	0	0
Colocation Total		6,600	2,414
Phillips RA	12.00%	792	290
Havre RA	21.00%	1,386	507
Valley RA	10.00%	660	241
Great Falls RA	35.00%	2,310	845
Nevada		73,711	26,961
Nevada State Office	7.60%	31,909	11,671
*Battle Mountain DO	20.00%	6,382	2,334
Shoshone-Eureka RA	45.00%	0	0
Colocation Total		6,382	2,334
Tonopah RA	55.00%	3,510	1,284
*Carson City DO	15.00%	4,786	1,751

VOLUME OF GRAPHIC AUTOMATED STORAGE IN MILLIONS
OF CHARACTERS BY LOCATION FOR 1997

TABLE B-5 (Continued)

OFFICES	PERCENTAGE SPREAD	PRESTRUC- TURED (CHARACTERS x MILLIONS)	UNSTRUC- TURED (CHARACTERS x MILLIONS)
Lahontan RA	55.00%	0	0
Walker RA	45.00%	0	0
Colocation Total		4,786	1,751
*Elko DO	15.00%	4,786	1,751
Elko RA	50.00%	0	0
Wells RA	50.00%	0	0
Colocation Total		4,786	1,751
*Ely DO	15.00%	4,786	1,751
Egan RA	50.00%	0	0
Schell RA	50.00%	0	0
Colocation Total		4,786	1,751
Las Vegas DO	20.00%	6,382	2,334
Stateline-Esmeralda RA	55.00%	3,510	1,284
Caliente RA	45.00%	2,872	1,050
*Winnemucca DO	15.00%	4,786	1,751
Paradise-Denio RA	45.00%	0	0
Sonoma-Gerlach RA	55.00%	0	0
Colocation Total		4,786	1,751
New Mexico		104,663	38,282
New Mexico State Office	8.60%	36,108	13,207
Albuquerque DO	11.00%	3,972	1,453
Rio Peuerco RA	27.00%	1,072	392
Farmington RA	27.00%	1,072	392
Taos RA	46.00%	1,827	668
*Las Cruces DO	13.00%	4,694	1,717
Las Cruces/Lordsburg RA	23.00%	0	0
White Sands RA	55.00%	0	0
Colocation Total		4,694	1,717
Socorro RA	22.00%	1,033	378
Tulsa DO	43.00%	15,526	5,679
Oklahoma RA	100.00%	15,526	5,679
Roswell DO	33.00%	11,916	4,358
Roswell RA	15.00%	1,787	654
Carlsbad RA	85.00%	10,128	3,705
Oregon		101,797	37,234
Oregon State Office	10.40%	43,665	15,971
*Burns DO	9.00%	3,930	1,437
Three Rivers RA	70.00%	0	0
Andrews RA	30.00%	0	0
Colocation Total		3,930	1,437
*Coos Bay DO	3.00%	1,310	479
Myrtlewood RA	50.00%	0	0

VOLUME OF GRAPHIC AUTOMATED STORAGE IN MILLIONS
OF CHARACTERS BY LOCATION FOR 1997

TABLE B-5 (Continued)

OFFICES	PERCENTAGE SPREAD	PRESTRUCTURED (CHARACTERS x MILLIONS)	UNSTRUCTURED (CHARACTERS x MILLIONS)
Tioga RA	25.00%	0	0
Umpqua RA	25.00%	0	0
Colocation Total		1,310	479
*Eugene DO	3.00%	1,310	479
Noti RA	15.00%	0	0
Dorena RA	15.00%	0	0
Mohawk RA	40.00%	0	0
Colocation Total		1,310	479
Lorane RA	30.00%	393	144
*Lakeview DO	9.00%	3,930	1,437
Warner Lake RA	30.00%	0	0
High Desert RA	30.00%	0	0
Colocation Total		3,930	1,437
Klamath Falls RA	40.00%	1,572	575
*Medford DO	3.00%	1,310	479
Klamath RA	25.00%	0	0
Butte Falls RA	20.00%	0	0
Jacksonville RA	15.00%	0	0
Grants Pass RA	30.00%	0	0
Glendale RA	10.00%	0	0
Colocation Total		1,310	479
*Prineville DO	9.00%	3,930	1,437
Central Oregon RA	40.00%	0	0
Deschutes RA	60.00%	0	0
Colocation Total		3,930	1,437
*Roseburg DO	2.00%	873	319
North Umpqua RA	55.00%	0	0
South Umpqua RA	20.00%	0	0
Dillard RA	10.00%	0	0
Drain RA	15.00%	0	0
Colocation Total		873	319
*Salem DO	6.00%	2,620	958
Santiam RA	15.00%	0	0
Alsea RA	20.00%	0	0
Yamhill RA	22.00%	0	0
Clackamas RA	20.00%	0	0
Colocation Total		2,620	958
Tillamook RA	23.00%	603	220
*Spokane DO	41.00%	17,903	6,548
Border RA	50.00%	0	0
Colocation Total		17,903	6,548
Wenatchee RA	50.00%	8,951	3,274
*Vale DO	15.00%	6,550	2,396
N. Malheur RA	25.00%	0	0

VOLUME OF GRAPHIC AUTOMATED STORAGE IN MILLIONS
OF CHARACTERS BY LOCATION FOR 1997

TABLE B-5 (Continued)

OFFICES	PERCENTAGE SPREAD	PRESTRUCTURED (CHARACTERS x MILLIONS)	UNSTRUCTURED (CHARACTERS x MILLIONS)
S. Malheur RA	30.00%	0	0
Colocation Total		6,550	2,396
Baker RA	45.00%	2,947	1,078
Utah		61,132	22,360
Utah State Office	5.60%	23,512	8,600
*Salt Lake DO	27.00%	6,348	2,322
Bear River RA	60.00%	0	0
Pony Express RA	40.00%	0	0
Colocation Total		6,348	2,322
Cedar City DO	20.00%	4,702	1,720
Kanab RA	30.00%	1,411	516
Escalante RA	20.00%	940	344
Beaver River RA	35.00%	1,646	602
Richfield DO	20.00%	4,702	1,720
*Warm Springs RA	24.00%	1,129	413
House Range RA	25.00%	1,176	430
Colocation Total		2,304	843
Henry Mountain RA	23.00%	1,082	396
Sevier River RA	28.00%	1,317	482
Moab DO	23.00%	5,408	1,978
San Juan RA	35.00%	1,893	692
Grand RA	30.00%	1,622	593
*Price River RA	17.00%	919	336
San Rafael RA	18.00%	973	356
Colocation Total		1,893	692
*Vernal DO	10.00%	2,351	860
Diamond Mountain RA	65.00%	0	0
Book Cliffs RA	35.00%	0	0
Colocation Total		2,351	860
Wyoming		89,843	32,862
Wyoming State Office	7.20%	30,230	11,057
Casper DO	65.00%	19,649	7,187
Platte River RA	15.00%	2,947	1,078
Buffalo RA	10.00%	1,965	719
Newcastle RA	75.00%	14,737	5,390
Rawlins DO	18.00%	5,441	1,990
*Divide RA	20.00%	1,088	398
Medicine Bow RA	43.00%	2,340	856
Colocation Total		3,428	1,254
Lander RA	37.00%	2,013	736
Rock Springs DO	10.00%	3,023	1,106
*Big Sandy RA	22.00%	665	243

VOLUME OF GRAPHIC AUTOMATED STORAGE IN MILLIONS
OF CHARACTERS BY LOCATION FOR 1997

TABLE B-5 (Continued)

OFFICES	PERCENTAGE SPREAD	PRESTRUCTURED (CHARACTERS x MILLIONS)	UNSTRUCTURED (CHARACTERS x MILLIONS)
Salt Wells RA	20.00%	605	221
Colocation Total		1,270	464
Kemmerer RA	26.00%	786	287
Pinedale RA	32.00%	967	354
*Worland DO	7.00%	2,116	774
Grass Creek RA	22.00%	0	0
Washakie RA	18.00%	0	0
Colocation Total		2,116	774
Cody RA	60.00%	1,270	464
TOTAL		1,059,497	387,532

VOLUME OF GRAPHIC AUTOMATED STORAGE IN MILLIONS
OF CHARACTERS BY LOCATION FOR 1997

TABLE B-5 (Continued)

B.6 Total Automated Storage in Millions of Characters by Location for 1997 (Unstructured Graphics)

Table B-6, "Total Automated Storage in Millions of Characters by Location for 1997 (Unstructured Graphics)" shows estimates of the total automated storage required for ALMRS, summing estimates of the storage required for both alphanumeric and unstructured graphics data. The estimates are provided for each BLM office and were computed by summing of the "Total" column from Table B-4 and the "Unstructured" column from Table B-5. Please refer to Tables B-4 and B-5 for explanations of the techniques and sources of information used to produce this table.

OFFICES	ALPHA-NUMERIC (CHARACTERS x MILLIONS)	UNSTRUCTURED GRAPHICS (CHARACTERS x MILLIONS)	TOTAL
Denver Service Center	22,250		22,250
Arizona	7,993	25,440	33,433
Arizona State Office	2,108	11,211	13,319
Arizona Strip DO	684	897	1,581
*Vermillon RA			
Shivwits RA			
Dixie RA (Utah)[1]			
Colocation Total	719	1,155	1,873
*Phoenix DO			
Lower Gila RA			
Phoenix RA			
Colocation Total	1,675	8,072	9,746
Kingman RA	794	1,695	2,489
*Safford DO			
San Simon RA			
Gila RA			
Colocation Total	792	1,682	2,474
*Yuma DO			
Yuma RA			
Colocation Total	638	561	1,198
Havasu RA	583	168	751
California	16,965	45,058	62,023
California State Office	2,715	15,357	18,072
Bakersfield DO	1,315	5,375	6,690
Bishop RA	620	430	1,050
Caliente RA	801	1,720	2,521
Folsom RA	824	1,881	2,705
Hollister RA	749	1,344	2,092
Susanville DO	733	1,229	1,961
Eagle Lake RA	638	553	1,191
Cedarville RA	603	307	910
Alturas RA	612	369	980
*Ukiah DO			
Clear Lake RA			
Colocation Total	1,034	3,379	4,413
Arcata RA	679	845	1,523
Redding RA	773	1,520	2,294
California Desert DO	1,315	5,375	6,690
El Centro RA	635	538	1,173
Barstow RA	862	2,150	3,012
Indio RA	635	538	1,173

1 = Colocated in Arizona but included in Utah figures.

TOTAL AUTOMATED STORAGE IN MILLIONS OF CHARACTERS
BY LOCATION FOR 1997 (UNSTRUCTURED GRAPHICS)

TABLE B-6

OFFICES	ALPHA-NUMERIC (CHARACTERS x MILLIONS)	UNSTRUC-TURED GRAPHICS (CHARACTERS x MILLIONS)	TOTAL
Needles RA	711	1,075	1,786
Ridgecrest RA	711	1,075	1,786
Colorado	12,581	35,351	47,932
Colorado State Office	2,166	11,979	14,145
Canon City DO	1,813	9,343	11,156
Northeast RA	1,500	7,007	8,507
San Luis RA	635	561	1,196
Royal Gorge RA	798	1,775	2,573
Craig DO	705	1,078	1,783
Kremmling RA	603	323	927
White River RA	603	323	927
Little Snake RA	618	431	1,049
*Grand Junction DO			
Grand Junction RA			
Colocation Total	624	479	1,104
Glenwood Springs RA	592	240	832
*Montrose DO			
Uncompahgre Basin RA			
Colocation Total	705	1,078	1,783
Gunnison Basin RA	601	302	902
San Juan RA	618	431	1,049
Eastern States	8,853	51,600	60,453
Eastern States Office	3,866	25,800	29,666
Jackson DO	2,015	11,352	13,367
Milwaukee DO	2,379	14,190	16,569
Rolla RA	593	258	851
Idaho	7,524	18,817	26,341
Idaho State Office	1,695	8,600	10,295
*Boise DO			
Cascade RA			
Owyhee RA			
Bruneau RA			
Jarbidge RA			
Colocation Total	833	2,064	2,897
*Burley DO			
Deep Creek RA			
Snake River RA			
Colocation Total	674	860	1,534
*Coeur d'Alene DO			
Emerald Empire RA			

TOTAL AUTOMATED STORAGE IN MILLIONS OF CHARACTERS
BY LOCATION FOR 1997 (UNSTRUCTURED GRAPHICS)

TABLE B-6 (Continued)

OFFICES	ALPHA-NUMERIC (CHARACTERS x MILLIONS)	UNSTRUCTURED GRAPHICS (CHARACTERS x MILLIONS)	TOTAL
Colocation Total	833	2,064	2,897
Cottonwood RA	724	1,238	1,962
*Idaho Falls DO			
Big Butte RA			
Medicine Lodge RA			
Colocation Total	764	1,548	2,312
Pocatello RA	621	464	1,086
*Salmon DO			
Lemhi RA			
Challis RA			
Colocation Total	730	1,290	2,020
*Shoshone DO			
Monument RA			
Bennett Hills RA			
Colocation Total	651	688	1,339
Montana	15,627	53,566	69,193
Montana State Office	3,484	20,118	23,602
*Butte DO			
Headwaters RA			
Colocation Total	1,057	3,420	4,477
Dillon RA	659	684	1,343
Garnet RA	809	1,710	2,519
Miles City DO	1,905	9,254	11,160
*Big Dry RA			
Powder River RA			
Colocation Total	991	2,961	3,952
South Dakota RA	1,313	5,182	6,496
Billings RA	721	1,111	1,832
Dickinson DO	1,262	4,828	6,090
*Lewistown DO			
Judith RA			
Colocation Total	911	2,414	3,325
Phillips RA	602	290	892
Havre RA	634	507	1,141
Valley RA	595	241	837
Great Falls RA	683	845	1,528
Nevada	9,068	26,961	36,030
Nevada State Office	2,061	11,671	13,732
*Battle Mountain DO			
Shoshone-Eureka RA			
Colocation Total	860	2,334	3,195

TOTAL AUTOMATED STORAGE IN MILLIONS OF CHARACTERS
BY LOCATION FOR 1997 (UNSTRUCTURED GRAPHICS)

TABLE B-6 (Continued)

OFFICES	ALPHA-NUMERIC (CHARACTERS x MILLIONS)	UNSTRUC-TURED GRAPHICS (CHARACTERS x MILLIONS)	TOTAL
Tonopah RA	725	1,284	2,009
*Carson City DO			
Lahontan RA			
Walker RA			
Colocation Total	785	1,751	2,536
*Elko DO			
Elko RA			
Wells RA			
Colocation Total	785	1,751	2,536
*Ely DO			
Egan RA			
Schell RA			
Colocation Total	785	1,751	2,536
Las Vegas DO	860	2,334	3,195
Stateline-Esmeralda RA	725	1,284	2,009
Caliente RA	695	1,050	1,746
*Winnemucca DO			
Paradise-Denio RA			
Sonoma-Gerlach RA			
Colocation Total	785	1,751	2,536
New Mexico	12,173	38,282	50,456
New Mexico State Office	2,441	13,207	15,648
Albuquerque DO	767	1,453	2,220
Rio Peuerco RA	616	392	1,008
Farmington RA	616	392	1,008
Taos RA	655	668	1,324
*Las Cruces DO			
Las Cruces/Lordsburg RA			
White Sands RA			
Colocation Total	805	1,717	2,522
Socorro RA	614	378	992
Tulsa DO	1,369	5,679	7,048
Oklahoma RA	1,369	5,679	7,048
Roswell DO	1,181	4,358	5,539
Roswell RA	653	654	1,307
Carlsbad RA	1,088	3,705	4,792
Oregon	13,562	37,234	50,797
Oregon State Office	2,533	15,971	18,505
*Burns DO			
Three Rivers RA			
Andrews RA			

TOTAL AUTOMATED STORAGE IN MILLIONS OF CHARACTERS
BY LOCATION FOR 1997 (UNSTRUCTURED GRAPHICS)

TABLE B-6 (Continued)

OFFICES	ALPHA-NUMERIC (CHARACTERS x MILLIONS)	UNSTRUC-TURED GRAPHICS (CHARACTERS x MILLIONS)	TOTAL
Colocation Total	738	1,437	2,175
*Coos Bay DO			
Myrtlewood RA			
Tioga RA			
Umpqua RA			
Colocation Total	619	479	1,099
*Eugene DO			
Noti RA			
Dorena RA			
Mohawk RA			
Colocation Total	619	479	1,099
Lorane RA	578	144	722
*Lakeview DO			
Warner Lake RA			
High Desert RA			
Colocation Total	738	1,437	2,175
Klamath Falls RA	631	575	1,206
*Medford DO			
Klamath RA			
Butte Falls RA			
Jacksonville RA			
Grants Pass RA			
Glendale RA			
Colocation Total	619	479	1,099
*Prineville DO			
Central Oregon RA			
Deschutes RA			
Colocation Total	738	1,437	2,175
*Roseburg DO			
North Umpqua RA			
South Umpqua RA			
Dillard RA			
Drain RA			
Colocation Total	600	319	919
*Salem DO			
Santiam RA			
Alsea RA			
Yamhill RA			
Clackamas RA			
Colocation Total	679	958	1,637
Tillamook RA	587	220	808
*Spokane DO			
Border RA			

TOTAL AUTOMATED STORAGE IN MILLIONS OF CHARACTERS
BY LOCATION FOR 1997 (UNSTRUCTURED GRAPHICS)

TABLE B-6 (Continued)

OFFICES	ALPHA-NUMERIC (CHARACTERS x MILLIONS)	UNSTRUC-TURED GRAPHICS (CHARACTERS x MILLIONS)	TOTAL
Colocation Total	1,369	6,548	7,918
Wenatchee RA	965	3,274	4,239
*Vale DO			
N. Malheur RA			
S. Malheur RA			
Colocation Total	856	2,396	3,252
Baker RA	693	1,078	1,771
Utah	11,400	22,360	33,760
Utah State Office	1,713	8,600	10,313
*Salt Lake DO			
Bear River RA			
Pony Express RA			
Colocation Total	872	2,322	3,194
Cedar City DO	791	1,720	2,511
Kanab RA	629	516	1,145
Escalante RA	606	344	950
Beaver River RA	641	602	1,243
Richfield DO	791	1,720	2,511
*Warm Springs RA			
House Range RA			
Colocation Total	673	843	1,516
Henry Mountain RA	613	396	1,009
Sevier River RA	625	482	1,106
Moab DO	825	1,978	2,803
San Juan RA	653	692	1,345
Grand RA	640	593	1,233
*Price River RA			
San Rafael RA			
Colocation Total	653	692	1,345
*Vernal DO			
Diamond Mountain RA			
Book Cliffs RA			
Colocation Total	675	860	1,536
Wyoming	12,325	32,862	45,187
Wyoming State Office	2,069	11,057	13,126
Casper DO	1,541	7,187	8,728
Platte River RA	707	1,078	1,785
Buffalo RA	658	719	1,377
Newcastle RA	1,296	5,390	6,686
Rawlins DO	832	1,990	2,822
*Divide RA			

TOTAL AUTOMATED STORAGE IN MILLIONS OF CHARACTERS
BY LOCATION FOR 1997 (UNSTRUCTURED GRAPHICS)

TABLE B-6 (Continued)

OFFICES	ALPHA-NUMERIC (CHARACTERS x MILLIONS)	UNSTRUC-TURED GRAPHICS (CHARACTERS x MILLIONS)	TOTAL
Medicine Bow RA			
Colocation Total	731	1,254	1,985
Lander RA	661	736	1,397
Rock Springs DO	711	1,106	1,817
*Big Sandy RA			
Salt Wells RA			
Colocation Total	623	464	1,088
Kemmerer RA	599	287	887
Pinedale RA	608	354	962
*Worland DO			
Grass Creek RA			
Washakie RA			
Colocation Total	666	774	1,440
Cody RA	623	464	1,088
TOTAL	150,321	387,532	537,853

TOTAL AUTOMATED STORAGE IN MILLIONS OF CHARACTERS
BY LOCATION FOR 1997 (UNSTRUCTURED GRAPHICS)

TABLE B-6 (Continued)

B.7 Total Automated Storage in Millions of Characters by Location for 1997 (Prestructured Graphics)

Table B-7, "Total Automated Storage in Millions of Characters by Location for 1997 (Prestructured Graphics)," shows estimates of the total automated storage required for ALMRS, summing estimates of the storage required for alphanumeric and prestructured graphics. The estimates are provided for each BLM location and were computer by summing the "Total" column from Table B-4 with the "Prestructured" column from Table B-5. Refer to Tables B-4 and B-5 for explanations of the techniques and sources of information used to produce this table.

OFFICES	ALPHA-NUMERIC (CHARACTERS x MILLIONS)	PRESTRUC-TURED GRAPHICS (CHARACTERS x MILLIONS)	TOTAL
Denver Service Center	22,250		22,250
Arizona	7,993	69,551	77,544
Arizona State Office	2,108	30,650	32,758
Arizona Strip DO	684	2,452	3,136
*Vermillon RA			
Shivwits RA			
Dixie RA (Utah)[1]			
Colocation Total	719	3,157	3,876
*Phoenix DO			
Lower Gila RA			
Phoenix RA			
Colocation Total	1,675	22,068	23,743
Kingman RA	794	4,634	5,428
*Safford DO			
San Simon RA			
Gila RA			
Colocation Total	792	4,597	5,390
*Yuma DO			
Yuma RA			
Colocation Total	638	1,532	2,170
Havasu RA	583	460	1,043
California	16,965	123,187	140,152
California State Office	2,715	41,986	44,701
Bakersfield DO	1,315	14,695	16,010
Bishop RA	620	1,176	1,796
Caliente RA	801	4,702	5,504
Folsom RA	824	5,143	5,967
Hollister RA	749	3,674	4,422
Susanville DO	733	3,359	4,091
Eagle Lake RA	638	1,511	2,149
Cedarville RA	603	840	1,443
Alturas RA	612	1,008	1,619
*Ukiah DO			
Clear Lake RA			
Colocation Total	1,034	9,237	10,271
Arcata RA	679	2,309	2,988
Redding RA	773	4,157	4,930
California Desert DO	1,315	14,695	16,010
El Centro RA	635	1,470	2,105
Barstow RA	862	5,878	6,740
Indio RA	635	1,470	2,105

1 = Colocated in Arizona but included in Utah figures.

TOTAL AUTOMATED STORAGE IN MILLIONS OF CHARACTERS
BY LOCATION FOR 1997 (PRESTRUCTURED GRAPHICS)

TABLE B-7

OFFICES	ALPHA-NUMERIC (CHARACTERS x MILLIONS)	PRESTRUCTURED GRAPHICS (CHARACTERS x MILLIONS)	TOTAL
Needles RA	711	2,939	3,650
Ridgecrest RA	711	2,939	3,650
Colorado	12,581	96,649	109,230
Colorado State Office	2,166	32,749	34,915
Canon City DO	1,813	25,544	27,357
Northeast RA	1,500	19,158	20,658
San Luis RA	635	1,533	2,168
Royal Gorge RA	798	4,853	5,651
Craig DO	705	2,947	3,652
Kremmling RA	603	884	1,488
White River RA	603	884	1,488
Little Snake RA	618	1,179	1,797
*Grand Junction DO			
Grand Junction RA			
Colocation Total	624	1,310	1,934
Glenwood Springs RA	592	655	1,247
*Montrose DO			
Uncompahgre Basin RA			
Colocation Total	705	2,947	3,652
Gunnison Basin RA	601	825	1,426
San Juan RA	618	1,179	1,797
Eastern States	8,853	141,073	149,926
Eastern States Office	3,866	70,536	74,403
Jackson DO	2,015	31,036	33,051
Milwaukee DO	2,379	38,795	41,174
Rolla RA	593	705	1,298
Idaho	7,524	51,445	58,969
Idaho State Office	1,695	23,512	25,207
*Boise DO			
Cascade RA			
Owyhee RA			
Bruneau RA			
Jarbidge RA			
Colocation Total	833	5,643	6,475
*Burley DO			
Deep Creek RA			
Snake River RA			
Colocation Total	674	2,351	3,025
*Coeur d'Alene DO			
Emerald Empire RA			

TOTAL AUTOMATED STORAGE IN MILLIONS OF CHARACTERS
BY LOCATION FOR 1997 (PRESTRUCTURED GRAPHICS)

TABLE B-7 (Continued)

OFFICES	ALPHA-NUMERIC (CHARACTERS x MILLIONS)	PRESTRUC-TURED GRAPHICS (CHARACTERS x MILLIONS)	TOTAL
Colocation Total	833	5,643	6,475
Cottonwood RA	724	3,386	4,109
*Idaho Falls DO			
Big Butte RA			
Medicine Lodge RA			
Colocation Total	764	4,232	4,997
Pocatello RA	621	1,270	1,891
*Salmon DO			
Lemhi RA			
Challis RA			
Colocation Total	730	3,527	4,257
*Shoshone DO			
Monument RA			
Bennett Hills RA			
Colocation Total	651	1,881	2,532
Montana	15,627	146,447	162,075
Montana State Office	3,484	55,002	58,486
*Butte DO			
Headwaters RA			
Colocation Total	1,057	9,350	10,408
Dillon RA	659	1,870	2,530
Garnet RA	809	4,675	5,484
Miles City DO	1,905	25,301	27,206
*Big Dry RA			
Powder River RA			
Colocation Total	991	8,096	9,087
South Dakota RA	1,313	14,168	15,482
Billings RA	721	3,036	3,758
Dickinson DO	1,262	13,200	14,462
*Lewistown DO			
Judith RA			
Colocation Total	911	6,600	7,511
Phillips RA	602	792	1,394
Havre RA	634	1,386	2,020
Valley RA	595	660	1,255
Great Falls RA	683	2,310	2,993
Nevada	9,068	73,711	82,779
Nevada State Office	2,061	31,909	33,970
*Battle Mountain DO			
Shoshone-Eureka RA			
Colocation Total	860	6,382	7,242

TOTAL AUTOMATED STORAGE IN MILLIONS OF CHARACTERS
BY LOCATION FOR 1997 (PRESTRUCTURED GRAPHICS)

TABLE B-7 (Continued)

OFFICES	ALPHA-NUMERIC (CHARACTERS x MILLIONS)	PRESTRUC-TURED GRAPHICS (CHARACTERS x MILLIONS)	TOTAL
Tonopah RA	725	3,510	4,235
*Carson City DO			
Lahontan RA			
Walker RA			
Colocation Total	785	4,786	5,572
*Elko DO			
Elko RA			
Wells RA			
Colocation Total	785	4,786	5,572
*Ely DO			
Egan RA			
Schell RA			
Colocation Total	785	4,786	5,572
Las Vegas DO	860	6,382	7,242
Stateline-Esmeralda RA	725	3,510	4,235
Caliente RA	695	2,872	3,567
*Winnemucca DO			
Paradise-Denio RA			
Sonoma-Gerlach RA			
Colocation Total	785	4,786	5,572
New Mexico	12,173	104,663	116,836
New Mexico State Office	2,441	36,108	38,549
Albuquerque DO	767	3,972	4,739
Rio Peuerco RA	616	1,072	1,688
Farmington RA	616	1,072	1,688
Taos RA	655	1,827	2,482
*Las Cruces DO			
Las Cruces/Lordsburg RA			
White Sands RA			
Colocation Total	805	4,694	5,499
Socorro RA	614	1,033	1,647
Tulsa DO	1,369	15,526	16,895
Oklahoma RA	1,369	15,526	16,895
Roswell DO	1,181	11,916	13,096
Roswell RA	653	1,787	2,440
Carlsbad RA	1,088	10,128	11,216
Oregon	13,562	101,797	115,360
Oregon State Office	2,533	43,665	46,199
*Burns DO			
Three Rivers RA			
Andrews RA			

TOTAL AUTOMATED STORAGE IN MILLIONS OF CHARACTERS
BY LOCATION FOR 1997 (PRESTRUCTURED GRAPHICS)

TABLE B-7 (Continued)

OFFICES	ALPHA-NUMERIC (CHARACTERS x MILLIONS)	PRESTRUCTURED GRAPHICS (CHARACTERS x MILLIONS)	TOTAL
Colocation Total	738	3,930	4,668
*Coos Bay DO			
Myrtlewood RA			
Tioga RA			
Umpqua RA			
Colocation Total	619	1,310	1,929
*Eugene DO			
Noti RA			
Dorena RA			
Mohawk RA			
Colocation Total	619	1,310	1,929
Lorane RA	578	393	971
*Lakeview DO			
Warner Lake RA			
High Desert RA			
Colocation Total	738	3,930	4,668
Klamath Falls RA	631	1,572	2,203
*Medford DO			
Klamath RA			
Butte Falls RA			
Jacksonville RA			
Grants Pass RA			
Glendale RA			
Colocation Total	619	1,310	1,929
*Prineville DO			
Central Oregon RA			
Deschutes RA			
Colocation Total	738	3,930	4,668
*Roseburg DO			
North Umpqua RA			
South Umpqua RA			
Dillard RA			
Drain RA			
Colocation Total	600	873	1,473
*Salem DO			
Santiam RA			
Alsea RA			
Yamhill RA			
Clackamas RA			
Colocation Total	679	2,620	3,298
Tillamook RA	587	603	1,190
*Spokane DO			
Border RA			

TOTAL AUTOMATED STORAGE IN MILLIONS OF CHARACTERS
BY LOCATION FOR 1997 (PRESTRUCTURED GRAPHICS)

TABLE B-7 (Continued)

OFFICES	ALPHA-NUMERIC (CHARACTERS x MILLIONS)	PRESTRUC-TURED GRAPHICS (CHARACTERS x MILLIONS)	TOTAL
Colocation Total	1,369	17,903	19,272
Wenatchee RA	965	8,951	9,916
*Vale DO			
N. Malheur RA			
S. Malheur RA			
Colocation Total	856	6,550	7,406
Baker RA	693	2,947	3,641
Utah	11,400	61,132	72,532
Utah State Office	1,713	23,512	25,226
*Salt Lake DO			
Bear River RA			
Pony Express RA			
Colocation Total	872	6,348	7,220
Cedar City DO	791	4,702	5,493
Kanab RA	629	1,411	2,040
Escalante RA	606	940	1,547
Beaver River RA	641	1,646	2,287
Richfield DO	791	4,702	5,493
*Warm Springs RA			
House Range RA			
Colocation Total	673	2,304	2,977
Henry Mountain RA	613	1,082	1,695
Sevier River RA	625	1,317	1,941
Moab DO	825	5,408	6,233
San Juan RA	653	1,893	2,546
Grand RA	640	1,622	2,262
*Price River RA			
San Rafael RA			
Colocation Total	653	1,893	2,546
*Vernal DO			
Diamond Mountain RA			
Book Cliffs RA			
Colocation Total	675	2,351	3,027
Wyoming	12,325	89,843	102,168
Wyoming State Office	2,069	30,230	32,298
Casper DO	1,541	19,649	21,190
Platte River RA	707	2,947	3,655
Buffalo RA	658	1,965	2,623
Newcastle RA	1,296	14,737	16,033
Rawlins DO	832	5,441	6,273
*Divide RA			

TOTAL AUTOMATED STORAGE IN MILLIONS OF CHARACTERS
BY LOCATION FOR 1997 (PRESTRUCTURED GRAPHICS)

TABLE B-7 (Continued)

OFFICES	ALPHA-NUMERIC (CHARACTERS x MILLIONS)	PRESTRUC-TURED GRAPHICS (CHARACTERS x MILLIONS)	TOTAL
Medicine Bow RA			
Colocation Total	731	3,428	4,159
Lander RA	661	2,013	2,674
Rock Springs DO	711	3,023	3,734
*Big Sandy RA			
Salt Wells RA			
Colocation Total	623	1,270	1,893
Kemmerer RA	599	786	1,385
Pinedale RA	608	967	1,576
*Worland DO			
Grass Creek RA			
Washakie RA			
Colocation Total	666	2,116	2,782
Cody RA	623	1,270	1,893
TOTAL	150,321	1,059,497	1,209,819

TOTAL AUTOMATED STORAGE IN MILLIONS OF CHARACTERS
BY LOCATION FOR 1997 (PRESTRUCTURED GRAPHICS)

TABLE B-7 (Continued)

APPENDIX C

LEASE VS. PURCHASE COST COMPARISON

LEASE VS. PURCHASE COST COMPARISON

It generally is not advantageous to lease hardware in today's marketplace. Vendors have structured lease payment schedules so that break-even points for leased equipment occur early in the system life cycle. For example, the breakeven point for CPU's usually occurs between the second and third year, and for disks it occurs between the third and fourth year. Sample lease and purchase expenditures for a representative selection of CPU's and disks are presented in Table C-1. Costs are spread over an eight-year period to coincide with the operational life of the ALMRS system (see Appendix D). IBM and Data General equipment were selected for analysis because they are two of the few vendors from whom lease costs are available. The sources of data used in the analysis are as follows:

- Present value factors - OMB Circular A-94
- IBM Lease/Purchase costs - Datapro
- Data General Lease/Purchase Costs - Actual costs of recent FAA acquisition

Based on the results of this analysis, FEDSIM recommends that ALMRS acquisition planning be based on the assumption that all equipment will be purchased. All analyses in this report are based on purchase costs for ADP equipment.

	Purchase Costs*	Yearly Lease Costs**		YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	YR 7	YR 8	TOTAL 8-YR COST (Present Value)
CPU			PV FCTR	0.909	0.826	0.751	0.683	0.621	0.524	0.513	0.466	
IBM 4381		667,440		606,709	551,305	501,247	455,862	414,480	349,739	342,397	311,027	3,532,760
(R2)	753,080			684,550	10,804	9,823	8,934	8,123	6,854	6,710	6,095	741,892
IBM 4361		216,240		196,562	178,614	162,396	147,692	134,285	113,310	110,931	100,768	1,144,558
(ML5)	254,400			231,250	8,425	7,660	6,967	6,334	5,345	5,233	4,753	275,966
IBM 4361		45,300		41,178	37,418	34,020	30,940	28,131	23,737	23,239	21,110	239,773
(K3)	60,040			54,576	2,924	2,659	2,418	2,198	1,855	1,816	1,650	70,096
DG MV8000		120,612		109,636	99,626	90,580	82,378	74,900	63,201	61,874	56,205	638,399
	240,284			218,418	11,468	10,427	9,483	8,622	7,275	7,122	6,470	279,286
DISK												
IBM 3370		15,960		14,508	13,183	11,986	10,901	9,911	8,363	8,187	7,437	84,476
(A1)	37,244			33,855	1,457	1,325	1,205	1,095	924	905	822	41,588
IBM 3375		15,960		14,508	13,183	11,986	10,901	9,911	8,363	8,187	7,437	84,476
(A1)	39,708			36,095	1,378	1,253	1,139	1,036	874	856	777	43,407
IBM 3380		45,660		41,505	37,715	34,291	31,186	28,355	23,926	23,424	21,278	241,678
(A4)	81,100			73,720	2,825	2,568	2,336	2,124	1,792	1,754	1,594	88,713
DG 192 MB		19,884		18,075	16,424	14,933	13,581	12,348	10,419	10,200	9,266	105,246
	39,072			35,516	2,290	2,082	1,893	1,721	1,453	1,422	1,292	47,669

* Includes first year maintenance cost

** Includes maintenance costs

LEASE/PURCHASE COST COMPARISON

TABLE C-1

APPENDIX D

ANALYSIS OF CONFIGURATION ALTERNATIVES

ANALYSIS OF CONFIGURATION ALTERNATIVES

The land and mineral records functions of the Bureau of Land Management (BLM) are performed at all levels of the organizational structure. Case processing is performed at state, district and area offices. Most queries are generated by the state, district, and area offices. The Denver Service Center (DSC) and Washington Office (WO) generally perform management functions. This distribution of functions required the analysis determine the most cost effective distribution of ADP resources for the Automated Land and Mineral Records System (ALMRS).

ALMRS requirements for ADP resources include processors, data storage and user access devices. The user access devices include graphic and alphanumeric terminals, and hardcopy units. An important distinction in examining equipment distribution for ALMRS is that user access devices must be placed where the work is performed (i.e., to the area office level). Centralization of these devices would defeat the objective of ALMRS because users performing day-to-day activities would not have online access to processing and data. Thus, the analysis of configuration alternatives focuses on identifying the appropriate level of distribution for processors and online storage.

The following nine subsections describe the results of the analysis. The first three subsections present the approach used in the analysis which included the following steps:

- Development of an Analytical Baseline
- Identification of Relevant Cost Elements
- Identification of Configuration Alternatives

The next four subsections present the detailed results of each alternative analyzed:

- Distribution to the Area Office
- Distribution to the District Office
- Distribution to the State Office
- Distribution to the DSC (Centralization)

A subsection is then presented which examines the sensitivity of the analyses to a key assumption; the required speed of transmission for graphics data. The final subsection provides a summary of the findings.

A. DEVELOPMENT OF AN ANALYTICAL BASELINE

The first step in the FEDSIM analysis was to develop a baseline for examining the costs and advantages of each alternative. ALMRS will support 146 area offices, 53 district offices, 11 state offices and users at the DSC and Headquarters. The number of offices, the geographic dispersion of these offices, the office workload, the required number of user access devices, and the planned period of operation for ALMRS capabilities varies among states. FEDSIM developed typical or average values for each of these variables to provide the necessary baseline. Figure D-1 summarizes the key values derived.

1. Number of Offices

Based on the total number of BLM offices, FEDSIM determined that an average state includes five district offices and thirteen area offices. A review of the addresses of the offices indicates that as an average, seven of thirteen area offices are collocated with district offices.

2. Geographic Dispersion of Offices

FEDSIM used the addresses of the offices to determine approximate geographic dispersion based on mileage estimates provided by a United States atlas. The following average distances were developed.

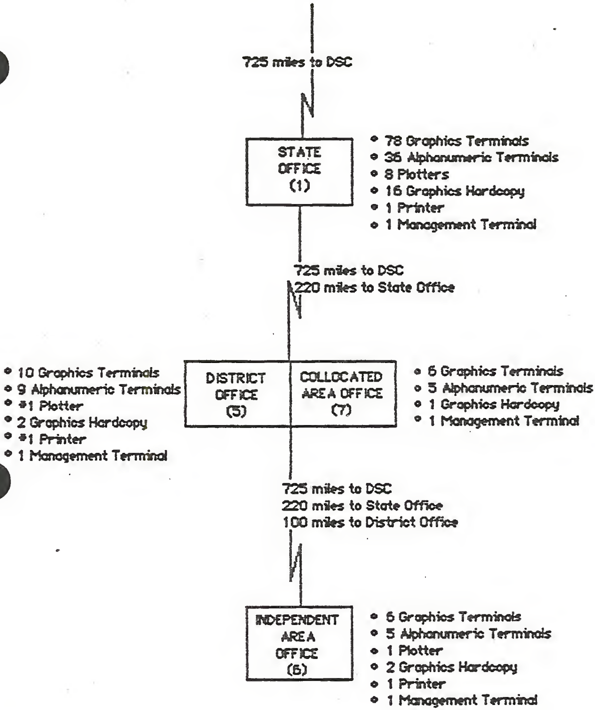
- Independent Area Office to District Office - 100 miles
- District and Area Offices to State Office - 220 miles
- District, Area, State Offices to DSC - 725 miles

3. Workload at Offices

FEDSIM used the following total daily workload forecasts for 1997 as the starting point for allocating workload to average offices:

- Alphanumeric case processing transactions : 21,474
- Graphic case processing transactions : 1,816
- Alphanumeric queries (excluding external users) : 10,7322
- Graphic queries : 6,7077

Based on distribution percentages provided by BLM, FEDSIM developed the per office workload averages summarized in Table D-1.



*Shared with collocated Area Office(s).

AVERAGE ALMRS STATE

FIGURE D-1

Workload Type/ Total Transactions Per Day	State Offices (11)		District Offices (46)		Area Offices (153)	
	All States	Average State	All Districts	Average District	All Areas	Average Area
Case Processing Alphanumeric 21,474	5,369	488	5,369	117	10,736	70
Case Processing Graphics 1,816	454	41	454	10	908	6
Query Alphanumeric 107,322	26,830	2,439	26,830	583	53,662	351
Query Graphics 67,077	26,830	2,439	13,417	292	26,830	175
Allocation Algorithm	25% of cases 25% of alphanumeric queries 40% of graphic queries (20% for external agencies)		25% of cases 25% of alphanumeric queries 20% of graphic queries		50% of cases 50% of alphanumeric queries 40% of graphic queries	

AVERAGE WORKLOAD - 1997 TRANSACTIONS

TABLE D-1

4. User Access Devices

FEDSIM derived the required number of user devices at each type of office by applying the following algorithms to the average workloads shown in Table D-1.

- One graphics terminal is required for every 32 graphics case or query transactions processed per day. This allows for an average of 15 minutes per transaction.

- A plot is required for 25 percent of the graphic case transactions and 9 percent of the graphic query transactions. One plotter is required for every 32 plots generated per day.

- A graphic hardcopy (as opposed to a plotter output) is required for 25 percent of the graphic case transactions and 21 percent of the graphic query transactions. One graphic hardcopy device is required for every 32 graphic outputs per day not requiring sophisticated plotter capabilities.

- One alphanumeric terminal is required for any combination of 48 alphanumeric case transactions and 96 alphanumeric query transactions per day. This allows an average of ten minutes for an alphanumeric case transaction which requires input of approximately 650 characters and five minutes for an alphanumeric query transaction which has limited input.

- One printer is required for every 3,000 pages of alphanumeric output generated daily. An average alphanumeric case transaction generates 0.86 pages of output, an average alphanumeric query generates 0.78 pages of output, and an average management report generates 2.4 pages of output.

- One management terminal is required at each area, district, and state office.

Figure D-1 shows the resulting quantities.

5. Period of Operation

Based on current ALMRS plans, the majority (60 percent) of the equipment will be installed in FY 1990. Since a life cycle period between FY 1986 and FY 1997 is being used for ALMRS cost estimation, the average operational period is eight years (FY 1990 - FY 1997).

B. IDENTIFICATION OF RELEVANT COST ELEMENTS

Table D-2 shows the cost elements associated with the ALMRS life cycle. In conducting the comparative analysis of configuration alternatives, FEDSIM identified those cost elements

COST CATEGORY	COST ELEMENT	CONFIGURATION SENSITIVE
System Development		
	Initiation Phase Completion	
	System Definition	
	Acquisition Management	
	System Design	
	System Development and Test	
System Configuration		
	Processor (Type A, B, C)	
	Disk Storage	*
	Off-line Backup	*
	Graphics Terminal	
	Digitizer	
	Plotter	
	Graphics Hardcopy	
	Alphanumeric Terminal	
	Alphanumeric Hardcopy	
	Management Terminal	
Communications		
	Low Capacity Lines	*
	High Capacity Lines	*
	Dial-up Lines	
Operations		
	Data Collection (Geographic and Other)	
	Site Preparation	*
	Training	
	Operations Personnel	
	Space Lease and Utilities	*
	Supplies (Graphics and Alphanumeric)	
	System Configuration Maintenance[1]	*
	Application Software Maintenance	

---

[1] Included for Disk Storage and Off-line Back-up only

LIFE CYCLE COST ELEMENTS

TABLE D-2

that vary based on the level of processing distribution. These cost elements are shown with an asterisk in Table D-2, and are the only ones examined in the comparative analysis. All other cost elements are unaffected by configuration distribution. The following paragraphs discuss the reasons why the cost elements not included are constant.

1. System Development

All of the system development cost elements remain unchanged regardless of the level of processing distribution. A standard ALMRS software capability will be developed and run at all sites where processors are placed. Virtually all costs are associated with development of the software capability and costs for additional copies of the package are effectively zero.

2. System Configuration

Although the specific types of processors used will vary depending on the level of distribution, FEDSIM estimates that the total costs of CPU will be a constant across all alternatives. In the more centralized alternatives, fewer processors will be required. The fewer processors in the more centralized alternatives will have to be more powerful since there will be more users per processor. In contrast to the technology of the 1960's and 1970's, current minicomputers offer equivalent processing power per dollar to their large scale counterparts. In fact, many vendors are providing high powered computers by using minicomputers in a multiprocessing mode. The DEC VAX family is a prime example of this approach.

The remaining system configuration cost elements which are considered constants are all user access devices; graphics terminals, digitizers, plotters, graphics hardcopy devices, alphanumeric terminals, alphanumeric hardcopy devices, and management terminals. The same number of these devices will be required regardless of the level of processing distribution. This is because ALMRS workload which drives the requirements for these devices remains unchanged. The location of these user access devices is also a constant because these must be located where the work is done regardless of where the processor is located.

3. Communications

The only communications cost element which remains unchanged is dial-up lines. This cost element is constant because in any configuration, users at all offices will need the capability to access interfacing systems located on various computers.

4. Operations

Data collection costs are constant regardless of the level of processing distribution. The costs for this element are associated with the efforts needed to develop the initial graphic and alphanumeric data bases. Expenditures for producing additional copies of this initial data load are effectively zero.

Training is also a constant since the same number of users will be trained regardless of the processor configuration.

The distribution of operations personnel will vary depending on the location of processors, but FEDSIM estimates that the total cost will remain unchanged. In the more centralized configurations a greater number of operations personnel will be required at processor sites to handle the more extensive and complex equipment inventory. This will be offset by reduced operations personnel at sites that do not have processors. Even when there is no processor at a site, some level of operations personnel will be required to support user access device and communications equipment (e.g., multiplexors and lines) coordination and maintenance.

The cost for supplies remains constant across all levels of distribution since the workload that generates graphic and alphanumeric hardcopy is invariant.

Application software maintenance costs do not vary based on the level of distribution. The costs associated with this element involve the enhancement and debug of the basic ALMRS software. The number of sites to which these enhancements must be provided has very little effect on this cost element.

C. IDENTIFICATION OF CONFIGURATION ALTERNATIVES

FEDSIM identified four configuration alternatives for detailed analysis. (1) Distribution to the Area Office, (2) Distribution to the District Office, (3) Distribution to the State Office, and (4) Distribution to the DSC (Centralization).

Distribution to the Area Office places computers and disk storage at independent area offices, district offices, state offices, and DSC.

Distribution to the District Office places computers and disk storage at the district offices, state offices and DSC and connects independent area offices with their parent district with high speed digital lines.

Distribution to the State Office places computers and disk storage only at state offices and the DSC and connects area offices and district offices to the state computers with high speed digital lines.

Distribution to the DSC (Centralization) places a single computer facility at the DSC and connects all offices to the DSC with high speed digital lines.

Two other alternatives were considered but eliminated from detailed analysis. The first involved the concept of "regionalization" where three to five regional data processing centers would be established. This alternative falls between the DSC centralized approach and the state level distribution. As detailed in subsequent sections, neither of these alternatives is cost effective. It can be extrapolated that "regionalization" would also not be cost effective.

The second alternative involved the concept of "ultimate distribution". In this alternative, processors and shared storage would be eliminated and each terminal would be upgraded to provide full computing and storage capabilities. This approach requires that each terminal access its own copy of the entire office data base. For example, every terminal at a state office would have an average of 14 Gigabytes (GB) of dedicated storage. This would require a minimum of 16,000 additional GB of storage over other alternatives and add $600 million to life cycle costs. Data base synchronization would be virtually impossible and new technologies would have to evolve to provide individual user terminals and computers that can access gigabytes of data. Thus, this alternative was eliminated from further analysis.

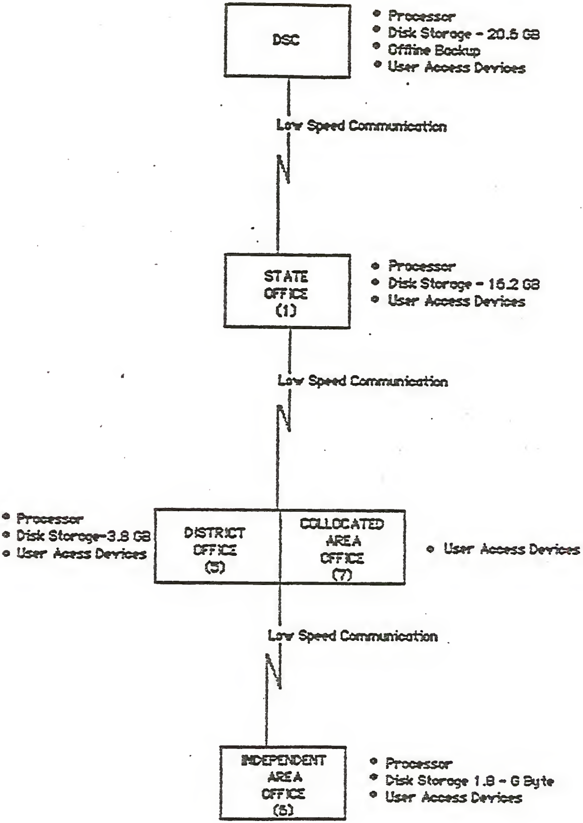
D. DISTRIBUTION TO THE AREA OFFICE

A configuration diagram for the alternative in which processors are distributed to the area office level is shown in Figure D-2. Independent area offices, district offices, state offices, and the DSC also have on-line storage. The components of each data base are shown in Table D-3. In this alternative, low speed lines connect each office with its parent in the organizational hierarchy so that the periodic transfer of data base updates in both directions can be accomplished.

Distribution to the area office offers several advantages. Since all user access devices are connected directly to a local processor and data base, transmission time for interactive traffic is virtually zero. This alternative can be implemented based on available technology and is not dependent on high speed communications capabilities which are not currently available in two major BLM states (Wyoming and Montana). Since BLM currently plans to install computers at the area office level for GIS, the interface between ALMRS and resource management data bases will be facilitated.

The disadvantage of this approach is that three on-line copies of graphic and alphanumeric data bases must be kept in synchronization and over 130 copies of the master name file must also be synchronized.

The variable costs associated with this alternative are shown in Table D-4. This alternative has high costs for disk storage which are offset by the low expenditures for



TYPICAL STATE CONFIGURATION-DISTRIBUTION TO AREA OFFICE

FIGURE D-2

OFFICE TYPE	DATA BASE COMPONENT	DISK STORAGE (GB)	TOTAL DISK STORAGE (GB)
Denver Service Center		20.6	20.6
	Alphanumeric	19	19
	Regulations	1.6	1.6
	Master Name	0.56	0.56
State Office (11 offices)		16.2	178.2
	Graphics[1]	13.91	153
	Alphanumeric	1.73	19
	Master Name	0.56	6.2
District Office (55 offices)		3.8	209
	Graphics[1]	2.89	159
	Alphanumeric	1.73	20
	Master Name	0.56	31
Independent Area Office (66 offices)		1.8	119
	Graphics[1]	1.06	70
	Alphanumeric	0.13	8.6
	Master Name	0.56	37

[1] Uses unstructured (computed) graphics data storage approach

DATA BASE COMPONENTS

TABLE D-3

COST /FISCAL YEAR

COST ELEMENT	1990	1991	1992	1993	1994	1995	1996	1997	TOTA
DISK STORAGE	$14,218,200	$0	$0	$0	$0	$0	$0	$0	$14,218
OFFLINE BACKUP	$93,000	$0	$0	$0	$0	$0	$0	$0	$93
LOW CAPACITY LINES	$1,021,010	$501,730	$501,730	$501,730	$501,730	$501,730	$501,730	$501,730	$4,533
HIGH CAPACITY LINES	$0	$0	$0	$0	$0	$0	$0	$0	
SITE PREPARATION	$2,700,000	$0	$0	$0	$0	$0	$0	$0	$2,720
SPACE LEASE/UTILITIES	$1,251,000	$1,251,000	$1,251,000	$1,251,000	$1,251,000	$1,251,000	$1,251,000	$1,251,000	$10,008
DISK/BACKUP MAINTENANCE	$1,192,400	$1,192,400	$1,192,400	$1,192,400	$1,192,400	$1,192,400	$1,192,400	$1,192,400	$9,540
			$0	$0	$0	$0	$0	$0	
TOTAL	$20,535,010	$2,945,130	$2,945,130	$2,945,130	$2,945,130	$2,945,130	$2,945,130	$2,945,130	$41,173
PRESENT VALUE FACTOR	0.621	0.564	0.513	0.466	0.423	0.385	0.350	0.319	
PRESENT VALUE COST	$12,745,163	$1,663,353	$1,510,954	$1,372,524	$1,245,375	$1,133,752	$1,030,364	$937,560	42

VARIABLE LIFE CYCLE COSTS
DISTRIBUTION = AREA

TABLE D-4

communications. The following paragraphs document the calculation of the variable costs for the distributed alternative.

1. Disk Storage

In this alternative, 526.6 GB of disk are required based on the following.

- 66 Independent Area Office required 1.8 GB of disk storage each for a total of 118.8 GB
- 55 District Offices require 3.8 GB of disk storage each for a total of 209 GB
- 11 State Offices require 16.2 GB of disk storage each for a total of 178.2 GB
- DSC requires 20.6 GB

FEDSIM used an average cost of $45,000 per GB to provide the appropriate configurations at each office. This provides storage in multiple units even for the smallest storage requirements (e.g., multiple units of approximately 500 MB each) instead of a single larger disk. Such an approach eliminates single point failure. A 40 percent discount was used because of the large volume of units which would be competitively procured. The resultant cost is $14,218,200 (526.6 GB x $45,000 x .6). This cost would be expended in FY 1990 for the average case.

2. Off-line Backup

A complete offline copy of the data base is required at DSC in this configuration. FEDSIM estimated a cost of $155,000 for a capability including four tape drives, 1,100 tapes, and appropriate physical tape storage and management facilities. The cost is discounted, assuming a 40 percent discount, is $93,000.

3. Low Capacity Lines

Low capacity lines operating at 4.8 to 9.6 kilobits per second (Kbps) are needed in this alternative to link offices for data base updates. FEDSIM applied AT&T and Regional Bell Operating Company (RBOC) rates for dedicated voice grade lines to the average geographic dispersion of BLM offices to develop cost estimates. AT&T and RBOC rates were used since they provide the widest geographic coverage of current suppliers. Options involving use of a network such as the GEONET capability recently established by DOI could also be used to provide the required service and should be analyzed prior to procurement of communications services.

Since the divestiture of AT&T, the calculation of communications costs has become more complex. The costs for a line now includes the following components:

- Local equipment (modems)
- Local lines (lines between office and AT&T center)
  - Installation
  - Monthly charges
- AT&T center connection
  - Installation
  - Monthly charges
- Line conditioning
- Long lines (lines between AT&T centers)

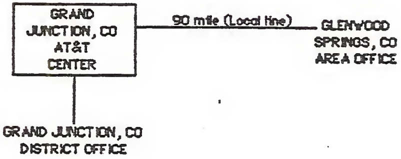
Several of the charges vary by state. FEDSIM developed the following unit costs for each component using averages for the eleven BLM states where required.

- Modems (e.g. Racal Milgo Omnimode 96) : $3000 each + $150 per year maintenance
- Local lines : $107 + $.89 per mile per month + $200 installation (or $77 per month and $200 installation if located in same city as AT&T switching center)
- AT&T Center connection : $15.45 per month + $78 for installation
- Line conditioning : $30 per month
- Long distance lines : $305.25 + $.30 per mile per month + $77 for installation

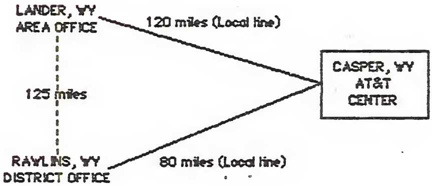
FEDSIM used a 40 percent discount factor in applying these unit costs to develop the communications cost estimates.

FEDSIM developed typical communications paths for the required connections. To communicate using terrestrial lines, a link must be established between each site and the closest AT&T, or RBOC center offering the required service (in this case voice grade communications). This means that in some situations, the length of the required lines will exceed the distance between the communicating sites. All of the BLM state offices and the DSC are located in cities where AT&T or RBOC offers voice grade services. However, only about one third of the district offices which must communicate with an independent area office are located in cities where AT&T offers voice grade services. Based on the locations of BLM offices, FEDSIM developed the typical communications models shown in Figures D-3 and D-4. These were

*CASE 1


GRAND JUNCTION, CO AT&T CENTER
90 mile (Local line)
GLENWOOD SPRINGS, CO AREA OFFICE
GRAND JUNCTION, CO DISTRICT OFFICE

* CASE 2

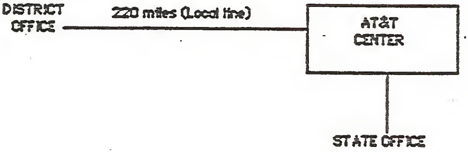


* Each case was used for 50% of the total sites.

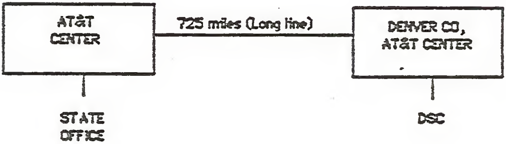
TYPICAL AREA-DISTRICT OFFICE VOICE GRADE PATHS

FIGURE D-3

DISTRICT - STATE



STATE - DSC



TYPICAL DISTRICT-STATE AND STATE-DSC VOICE GRADE PATHS

FIGURE D-4

used in conjunction with the typical unit costs to develop the costs shown in Table D-4.

4. High Capacity Digital Service

No high capacity digital service is required in this alternative.

5. Site Preparation

In this alternative, site preparation is required to establish a computer facility at each independent area office, district office, state office, and DSC. FEDSIM used a figure of $50/square foot for site preparation based on the experience of other agencies. This was applied to the following estimates of space requirements to develop the figures shown in Table D-4. The area required for a computer facility by office type is estimated to be 400 square feet for independent area offices and district offices, and 600 square feet for state offices and DSC.

6. Space Lease/Utilities

FEDSIM estimated an average yearly cost of $22.50 per square foot for space lease and utilities based on the experience of other agencies. This unit cost was applied to the estimates of space requirements at each office.

7. System Configuration Maintenance

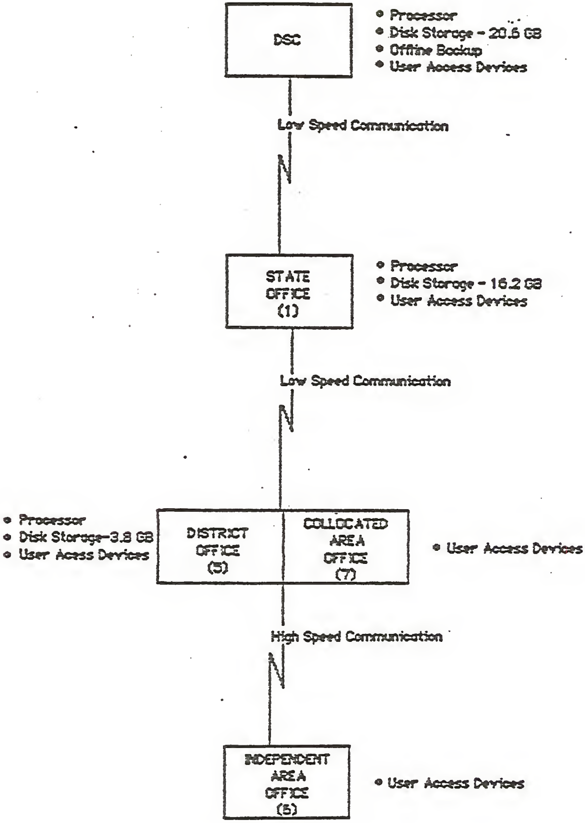
FEDSIM estimated the variable system maintenance costs by applying a 5 percent per year factor to the undiscounted prices for disk storage and off-line backup.

E. DISTRIBUTION TO DISTRICT OFFICE

In this alternative, processors and online storage are not provided to the independent area offices. Instead, a high speed communications line is used to connect user access devices at each independent area office to the processor and storage at its parent district office. Figure D-5 shows the configuration of this alternative.

An advantage of this alternative over the area office distributed approach is that the number of online graphic and alphanumeric data bases to be synchronized is reduced to two and the number of copies of the master name file is also reduced.

However, this approach results in transmission delays for graphics data required by independent area offices. A T-1 speed line which operates at 1.5 Million bits per second (Mbps) is included in the cost estimates for this alternative. Such a line provides transmission delay of less than a second for a typical 72,000 character graphics response. Line costs can be reduced at the expense of increased transmission delay.



TYPICAL STATE CONFIGURATION-DISTRIBUTION TO DISTRICT OFFICE

FIGURE D- 5

A disadvantage of this alternative is that implementation would require expansion of available communications capabilities provided by current suppliers. No switching centers providing high speed digital communication currently exist in Wyoming or Montana. The subsequent analysis assumes that such capabilities will be available in the next five years and also examines an option using satellite communications.

The variable costs associated with this alternative are shown in Table D-5 for terrestrial communication and Table D-6 for satellite communication. This alternative reduces costs for disk storage, low speed communication, site preparation, space lease and utilities as compared to the previous alternative which distributed processor and storage capabilities to the independent area offices. However, the tremendous costs for high speed lines result in life cycle expenditures which exceed those of the area office distribution alternative by over $40 million.

The following subsections describe the calculation of the variable costs for this alternative.

1. Disk Storage

In this alternative, the requirement for disk storage at the independent area offices is eliminated resulting in a total storage volume of 407.8 GB, a reduction of 118.8 GB over the alternative involving distribution to the independent area offices. The costs shown in Tables D-5 and D-6 were derived by combining this volume with an undiscounted unit cost of $45,000 per GB and a 40 percent discount.

2. Offline Backup

The requirement for off-line backup is unchanged from the alternative involving distribution to the independent area offices.

3. Low Capacity Lines

In this alternative, low capacity lines between the independent area offices and the district offices are no longer required. The costs presented in Tables D-5 and D-6 include expenditures still required for low speed lines between district and state offices, and state offices and the DSC. The costing methodology previously described was used to develop the appropriate cost estimates.

4. High Capacity Lines

High capacity lines are needed in this alternative so that graphics terminals at independent area offices can interact with the processors and data at the district offices. FEDSIM included a single T-1 line which operates at 1.5 Mbps between each independent area office and its parent district. For the option

COST /FISCAL YEAR

COST ELEMENT	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
DISK STORAGE	$11,018,300	$0	$0	$0	$0	$0	$0	$0	$11,018,
OFFLINE BACKUP	$93,000	$0	$0	$0	$0	$0	$0	$0	$93,
LOW CAPACITY LINES	$511,398	$251,754	$251,754	$251,754	$251,754	$251,754	$251,754	$251,754	$2,273,
HIGH CAPACITY LINES	$9,030,304	$6,800,112	$6,800,112	$6,800,112	$6,800,112	$6,800,112	$6,800,112	$6,800,112	$56,631,
SITE PREPARATION	$2,120,000	$0	$0	$0	$0	$0	$0	$0	$2,120,
SPACE LEASE/UTILITIES	$954,000	$954,000	$954,000	$954,000	$954,000	$954,000	$954,000	$954,000	$7,632,
DISK/BACKUP MAINTENANCE	$925,275	$925,275	$925,275	$925,275	$925,275	$925,275	$925,275	$925,275	$7,402,
			$0	$0	$0	$0	$0	$0	
TOTAL	$24,652,277	$8,931,141	$8,931,141	$8,931,141	$8,931,141	$8,931,141	$8,931,141	$8,931,141	$87,170,
PRESENT VALUE FACTOR	0.621	0.524	0.513	0.466	0.423	0.385	0.350	0.319	
PRESENT VALUE COST	$15,309,064	$4,679,918	$4,581,675	$4,161,912	$3,777,873	$3,438,489	$3,125,899	$2,849,034	[illegible]3,

VARIABLE LIFE CYCLE COSTS
DISTRIBUTION = DISTRICT
LINES = T1 TERRESTRIAL

TABLE D-5

COST /FISCAL YEAR

COST ELEMENT	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
DISK STORAGE	$11,010,380	$0	$0	$0	$0	$0	$0	$0	$11,010,
OFFLINE BACKUP	$93,000	$0	$0	$0	$0	$0	$0	$0	$93,
LOW CAPACITY LINES	$511,390	$251,754	$251,754	$251,754	$251,754	$251,754	$251,754	$251,754	$2,273,
HIGH CAPACITY LINES	$24,603,698	$13,770,720	$13,770,720	$13,770,720	$13,770,720	$13,770,720	$13,770,720	$13,770,720	$120,998,
SITE PREPARATION	$2,120,000	$0	$0	$0	$0	$0	$0	$0	$2,120,
SPACE LEASE/UTILITIES	$954,000	$954,000	$954,000	$954,000	$954,000	$954,000	$954,000	$954,000	$7,632,
DISK/BACKUP MAINTENANCE	$925,275	$925,275	$925,275	$925,275	$925,275	$925,275	$925,275	$925,275	$7,402,
			$0	$0	$0	$0	$0	$0	
TOTAL	$40,217,663	$15,901,749	$15,901,749	$15,901,749	$15,901,749	$15,901,749	$15,901,749	$15,901,749	$151,527,
ENT VALUE FACTOR	0.621	0.524	0.513	0.466	0.423	0.385	0.350	0.319	
T VALUE COST	$24,975,169	$8,332,516	$8,157,597	$7,410,215	$6,726,440	$6,122,173	$5,565,612	$5,072,358	$72,362,

VARIABLE LIFE CYCLE COSTS
DISTRIBUTION = DISTRICT
LINES = T1 SATELLITE

TABLE D-6

involving terrestrial communication, FEDSIM used AT&T rates since AT&T provides the widest geographic coverage of the current suppliers. For satellite services, FEDSIM also used the rates of AT&T since AT&T is the only vendor that provides satellite service by installing earth stations at customer premises. Other vendors such as Satellite Business Systems (SBS) require that terrestrial lines be run from the customer premises to the SBS service location. Since there are SBS service locations in only four ALMRS states, this approach is not practical. The GEONET network established by USGS is not a viable option since it does not provide dedicated high capacity lines.

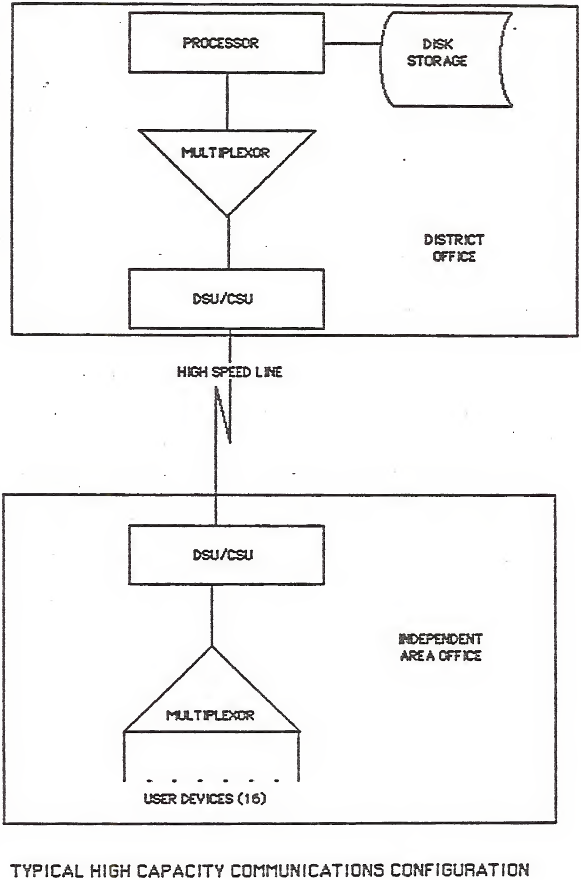
As in the case of low speed communications, there are many components which make up a digital data service. In addition to the elements associated with lines and AT&T connections, high speed digital service requires multiplexors to operate cost effectively. A multiplexor allows a number of terminals to timeshare the same high capacity line, thus greatly reducing the number of lines required. In addition, digital data transmission allow modems to be replaced by lower cost data service unit/ channel service units (DSU/CSU) and eliminates the need for line conditioning. Figure D-6 shows a typical configuration.

FEDSIM developed unit costs for each component of high speed digital transmission using averages for the eleven BLM states where required.

- Multiplexor with 16 lines (e.g. Racal-Milco Omnimux T-1) : $26,000 + $1,300 per year maintenance
- DSU/CSU (e.g. Avanti TPAC1.5, AT&T 2500 DSC) : $1000 + $50 per year maintenance
- Local lines : $630 + $31 per mile per month + $960 installation (or $590 per month + $960 installation if located in the same city as the AT&T switching center)
- AT&T center connection : $60 per month + $300 installation
- Long lines : $1,400 + $26 per mile per month

In the option involving satellite communications, the cost for local lines, center connection, and long lines are replaced by flat rates for earth stations and the space segments used to allow communications between earth stations. The rates are as follows:

- A Single-circuit earth station : $12,700 per month + $146,150 site preparation and installation
- Eight-circuit earth station : $14,850 per month + $147,450 site preparation and installation



TYPICAL HIGH CAPACITY COMMUNICATIONS CONFIGURATION

FIGURE D- 6

- Space segment : $9,000 per month

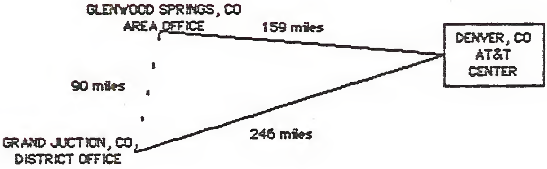
FEDSIM used a 40 percent discount factor in applying unit costs (except maintenance) to develop the communications cost estimates. It is important to note that achieving this level of discount may be difficult because only a limited number of suppliers can meet potential ALMRS requirements for high speed communication.

FEDSIM developed a typical communications path for terrestrial high speed digital service between the independent area offices and district offices. As opposed to the low speed communications case, there are very few AT&T centers supporting high speed digital communications in the ALMRS states. In most instances, high speed lines between independent area offices and the districts will have to be routed through an AT&T center located in the state capital or other large city. Figure D-7 shows the typical case used for costing. As Figure D-7 shows, the connection between the Glenwood Springs Area Office and Grand Junction District Office must now be made through Denver since the AT&T center at Grand Junction does not support high speed digital communications. This typical case was used in conjunction with the typical unit costs to develop the costs shown in Table D-5.

FEDSIM also determined the appropriate configuration for satellite communications. The single-circuit earth station is appropriate for ALMRS independent area offices and some district offices which require only one line. For district offices that support multiple independent area offices, an eight-channel earth station is cost effective. In the typical case, three of the five district offices in a state have at least one associated independent area office. Half of these support multiple independent area offices. A space segment is needed to support communications with each independent area office. FEDSIM used these considerations in conjunction with the unit costs for satellite communications components to develop the estimates shown in Table D-6.

5. Site Preparation

In this alternative, there are no changes in the site preparation costs for the district and state offices and the DSC. However, the site requirements for the independent area offices are reduced. FEDSIM estimates that only 200 square feet of space will be required at these sites to house the multiplexor, DSU/CSU, and output devices. FEDSIM applied the $50 per square foot figure for site preparation to the reduced requirements to derive the costs shown in Tables D-5 and D-6.



TYPICAL AREA-DISTRICT OFFICE HIGH SPEED DIGITAL PATH

FIGURE D-7

6. Space Lease/Utilities

FEDSIM applied the yearly rate of $22.50 per square foot to the reduced site requirements to derive the space lease/utilities costs shown in Tables D-5 and D-6.

7. System Configuration Maintenance

FEDSIM estimated the variable system maintenance costs by applying a 5 percent per year factor to the undiscounted prices for disk storage and offline backup.

F. DISTRIBUTION TO STATE OFFICE

In this alternative, virtually all ALMRS processing is done at the state level. High speed communications lines are used to connect area and district office to the state configuration. A configuration diagram for this alternative is shown in Figure D-8.

The major benefit of this alternative is that only a single copy of the online alphanumeric and graphics data base must be maintained and only twelve copies of the master name file are required. This alternative has the same disadvantages as the approach involving distribution to the district office; transmission delay and potential requirements for communications services which are not currently available.

Tables D-7 and D-8 show the variable costs associated with this alternative for terrestrial communications and satellite communications respectively. Again, the costs for high speed communications make this alternative more expensive than the approach involving processing and storage distribution to area offices.

1. Disk Storage

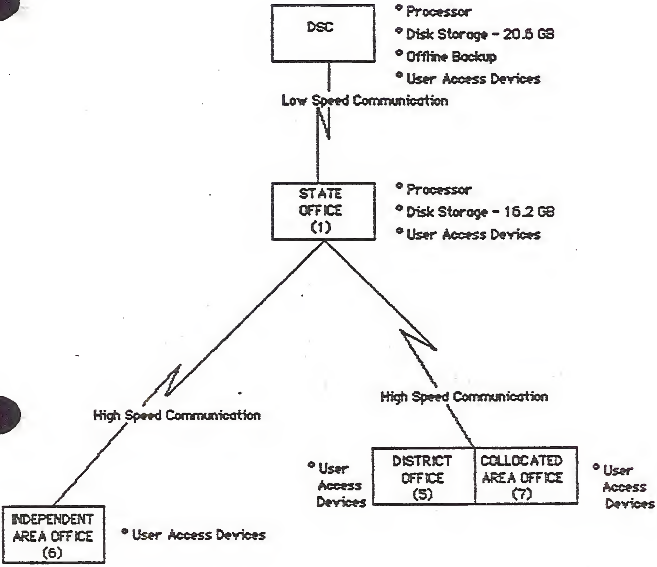
In this alternative, disk storage is required only at the state offices and the DSC. The resultant requirement is 198.8 GB which FEDSIM costed at an undiscounted unit cost of $45,000 per GB with an assumed discount of 40 percent.

2. Offline Backup

The requirement for offline backup remains unchanged from previously discussed alternatives.

3. Low Capacity Lines

The only low capacity lines required in this alternative connect states with the DSC so that data base updates can be sent from states to the backup master copy at DSC. Tables D-7 and D-8 include expenditures for this reduced requirement.



TYPICAL STATE CONFIGURATION-DISTRIBUTION TO STATE OFFICE

FIGURE D-8

COST /FISCAL YEAR

COST ELEMENT	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
DISK STORAGE	$5,367,600	$0	$0	$0	$0	$0	$0	$0	$5,367,
OFFLINE BACKUP	$93,000	$0	$0	$0	$0	$0	$0	$0	$93,
LOW CAPACITY LINES	$104,994	$61,728	$61,728	$61,728	$61,728	$61,728	$61,728	$61,728	$537,
HIGH CAPACITY LINES	$13,898,544	$7,617,192	$7,617,192	$7,617,192	$7,617,192	$7,617,192	$7,617,192	$7,617,192	$67,218,
SITE PREPARATION	$1,570,000	$0	$0	$0	$0	$0	$0	$0	$1,570,
SPACE LEASE/UTILITIES	$706,500	$706,500	$706,500	$706,500	$706,500	$706,500	$706,500	$706,500	$5,652,
DISK/BACKUP MAINTENANCE	$455,850	$455,850	$455,850	$455,850	$455,850	$455,850	$455,850	$455,850	$3,646,
			$0	$0	$0	$0	$0	$0	
TOTAL	$22,195,488	$8,840,462	$8,840,462	$8,840,462	$8,840,462	$8,840,462	$8,840,462	$8,840,462	$84,078,
PRESENT. VALUE FACTOR	0.621	0.524	0.513	0.466	0.423	0.385	0.350	0.319	
PRESENT VALUE COST	$13,783,322	$4,632,402	$4,535,157	$4,119,655	$3,739,515	$3,403,578	$3,094,162	$2,820,107	[illegible]23,

VARIABLE LIFE CYCLE COSTS
DISTRIBUTION = STATE
LINES = T1 TERRESTRIAL

TABLE D-7

COST /FISCAL YEAR

COST ELEMENT	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
DISK STORAGE	$5,347,600	$0	$0	$0	$0	$0	$0	$0	$5,367,6
OFFLINE BACKUP	$93,008	$0	$0	$0	$0	$0	$0	$0	$93,0
LOW CAPACITY LINES	$104,994	$61,720	$61,720	$61,724	$61,720	$61,720	$61,720	$61,720	$537,0
HIGH CAPACITY LINES	$40,420,718	$21,765,480	$21,765,480	$21,765,480	$21,765,480	$21,765,480	$21,765,480	$21,765,480	$192,779,0
SITE PREPARATION	$1,570,000	$0	$0	$0	$0	$0	$0	$0	$1,570,0
SPACE LEASE/UTILITIES	$706,500	$706,500	$706,500	$706,500	$706,500	$706,500	$706,500	$706,500	$5,652,0
DISK/BACKUP MAINTENANCE	$455,050	$455,050	$455,050	$455,050	$455,050	$455,050	$455,050	$455,050	$3,640,4
			$0	$0	$0	$0	$0	$0	
[illegible]	$48,717,834	$22,988,750	$22,988,750	$22,988,750	$22,988,750	$22,988,750	$22,988,750	$22,988,750	$209,639,1
[illegible]T VALUE FACTOR	0.621	0.524	0.513	0.466	0.423	0.385	0.350	0.319	
PRESENT VALUE COST	$30,253,787	$12,046,105	$11,793,229	$10,712,753	$9,724,241	$8,850,669	$8,046,063	$7,333,411	$98,760,2

VARIABLE LIFE CYCLE COSTS
DISTRIBUTION = STATE
LINES = T1 SATELLITE

TABLE D-8

4. High Capacity Lines

In this alternative, a high capacity line is needed between each independent area office and the state office, and between each district office and the state office. Since all state offices except Wyoming and Montana are located in the same city with an AT&T center providing high speed digital services, the line routing is more efficient in this alternative than in the approach involving area to district office communications. A typical link is an average of 220 miles running from a district or area office to an AT&T center in the state office city.

The unit rates described in Section D.F.4 are applicable to this case. The only additional item required is a larger multiplexor for the district-state connection so that an average of 44 user access devices at a district or collocated area office(s) can be supported. Such a device has an undiscounted purchase price of $59,000 and yearly maintenance cost of $2,950. Tables D-7 and D-8 show costs derived by applying unit costs to the typical link configuration.

5. Site Preparation

In this alternative, the site requirements for the district offices as well as the independent area offices are reduced to 200 square feet. The $50/square foot figure for site preparation was applied to the reduced requirements to derive the costs shown in Tables D-7 and D-8.

6. Space Lease/Utilities

FEDSIM applied the yearly rate of $22.50 per square foot to the reduced site requirements to derive the space lease/utilities costs shown in Tables D-7 and D-8.

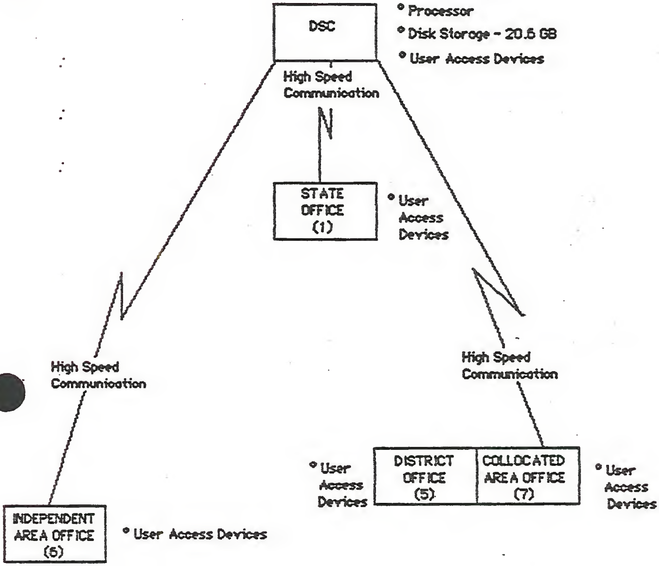
7. System Configuration Maintenance

FEDSIM estimated the variable system maintenance costs by applying a 5 percent per year factor to the undiscounted prices for disk storage and offline backup.

G. DISTRIBUTION TO THE DSC (CENTRALIZATION)

This alternative involves a single large computer complex at the DSC with high speed lines connecting areas, districts, and states to the DSC. A configuration diagram for this alternative is shown in Figure D-9.

The advantage of this alternative is that only a single copy of all ALMRS data will exist and file maintenance will be facilitated. In addition, communication with interfacing systems located at DSC will be facilitated. Transmission delay and unavailable communications services provide drawbacks and



TYPICAL STATE CONFIGURATION-CENTRALIZATION AT DSC

FIGURE D-9

Tables D-9 and D-10 show this alternative is cost prohibitive. The additional expenditures over more effective distributed approaches are over $200 million. The following subsections document the calculation of the variable costs for the centralized alternative.

1. Disk Storage

In this alternative, 173.6 GB is required to store a copy of graphic and alphanumeric data for all states and a single copy of the master name and regulation files. FEDSIM used unit cost of $45,000 per GB discounted by 40 percent to derive disk storage costs.

2. Offline Backup

There is no requirement for an offline copy of the data base at the DSC in this alternative since only a complete version will exist in the centralized complex.

3. Low Capacity Lines

There are no requirements for low capacity lines in this alternative.

4. High Capacity Lines

In this alternative, a high capacity line is needed between each independent area office and the DSC, and between each district office and the DSC. Because of the number of devices in each state office (140 average) FEDSIM estimates that two T-1 lines are required between each state office and the DSC. This will reduce contention problems and provide some backup capability. Figure D-10 shows the typical communications links required in this alternative.

The unit rates described in Sections D.F.4 and D.G.4 are applicable to the centralized case. The only additional item required is a very large multiplexor to handle 70 user access devices attached to each line from the State Office to DSC. A typical device has an undiscounted purchase price of $78,000 and a yearly maintenance cost of $3,900. FEDSIM combined the unit costs with the typical link configurations to derive the estimates shown in Tables D-9 and D-10.

5. Site Preparation

In this alternative, the site requirements for the district offices as well as the independent area offices are reduced to 200 square feet. Even though there are no processors at the state offices, FEDSIM estimates that 300 square feet will be required to house the large complement of multiplexors and user access devices. A much larger facility will be required at DSC because of the need to house the required disk storage

COST /FISCAL YEAR

COST ELEMENT	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
DISK STORAGE	$4,687,200	$0	$0	$0	$0	$0	$0	$0	$4,687,20
OFFLINE BACKUP	$0	$0	$0	$0	$0	$0	$0	$0	$
LOW CAPACITY LINES	$0	$0	$0	$0	$0	$0	$0	$0	$
HIGH CAPACITY LINES	$35,340,777	$29,118,561	$29,118,561	$29,118,561	$29,118,561	$29,118,561	$29,118,561	$29,118,561	$239,170,70
SITE PREPARATION	$1,555,000	$0	$0	$0	$0	$0	$0	$0	$1,555,00
SPACE LEASE/UTILITIES	$699,750	$699,750	$699,750	$699,750	$699,750	$699,750	$699,750	$699,750	$5,598,00
DISK/BACKUP MAINTENANCE	$390,600	$390,600	$390,600	$390,600	$390,600	$390,600	$390,600	$390,600	$3,124,80
			$0	$0	$0	$0	$0	$0	
TOTAL	$42,673,327	$30,208,911	$30,208,911	$30,208,911	$30,208,911	$30,208,911	$30,208,911	$30,208,911	$254,135.7
PRESENT VALUE FACTOR	0.621	0.524	0.513	0.466	0.423	0.385	0.350	0.319	
P[illegible] VALUE COST	$26,500,136	$15,829,469	$15,497,171	$14,077,353	$12,778,369	$11,630,431	$10,573,119	$9,636,643	$116,522,6

VARIABLE LIFE CYCLE COSTS
DISTRIBUTION = DSC
LINES = T1 TERRESTRIAL

TABLE D-9

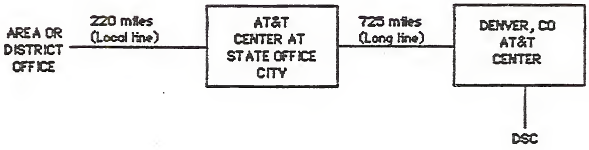
COST /FISCAL YEAR

COST ELEMENT	1990	1991	1992	1993	1994	1995	1996	1997	TOTA
DISK STORAGE	$4,687,200	$0	$0	$0	$0	$0	$0	$0	$4,687
OFFLINE BACKUP	$0	$0	$0	$0	$0	$0	$0	$0	
LOW CAPACITY LINES	$0	$0	$0	$0	$0	$0	$0	$0	
HIGH CAPACITY LINES	$47,265,000	$24,948,879	$24,948,879	$24,948,879	$24,948,879	$24,948,879	$24,948,879	$24,948,879	$221,907
SITE PREPARATION	$1,555,000	$0	$0	$0	$0	$0	$0	$0	$1,555
SPACE LEASE/UTILITIES	$699,750	$699,750	$699,750	$699,750	$699,750	$699,750	$699,750	$699,750	$5,598
DISK/BACKUP MAINTENANCE	$390,600	$390,600	$390,600	$390,600	$390,600	$390,600	$390,600	$390,600	$3,124
			$0	$0	$0	$0	$0	$0	
TOTAL	$54,597,550	$26,039,229	$26,039,229	$26,039,229	$26,039,229	$26,039,229	$26,039,229	$26,039,229	$236,872
PRESENT VALUE FACTOR	0.621	0.524	0.513	0.466	0.423	0.385	0.350	0.319	
PRESENT VALUE COST	$33,905,084	$13,644,556	$13,358,124	$12,134,281	$11,014,594	$10,025,103	$9,113,730	$8,306,514	[illegible]01

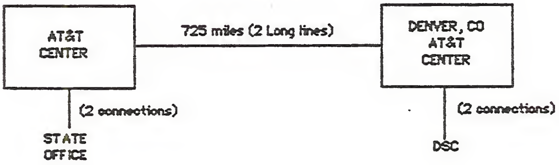
VARIABLE LIFE CYCLE COSTS
DISTRIBUTION = DSC
LINES = T1 SATELLITE

TABLE D-10

AREA OF DISTRICT - DSC



STATE - DSC



TYPICAL COMMUNICATIONS FOR CENTRALIZED CONFIGURATION

FIGURE D-10

(approximately 70 drives based on current technology) and large processor configuration. FEDSIM estimated that a 3,600 square foot facility is required in this case. The $50 per square foot figure for site preparation was applied to the space requirements to derive the costs shown in Tables D-9 and D-10.

6. Space Lease/Utilities

FEDSIM applied the yearly rate of $22.50 per square foot to the site requirements to derive the space lease/utilities costs shown in Tables D-9 and D-10.

7. System Configuration Maintenance

FEDSIM estimated the variable system maintenance costs by applying a 5 percent per year factor to the undiscounted prices for disk storage.

H. OPTIONS INVOLVING REDUCED LINE SPEEDS

Three of the four alternatives analyzed include high speed lines to allow for interactive graphics from telecommunicating sites. As shown in the cost estimates for these alternatives, the high speed lines represent a very significant expenditure. The T-1 lines (1.5 Mbps) used as the basis for developing costs provide transmission times which allow for true interactive graphics. However, the expenditures required for these lines are prohibitive and alternatives using this approach are not cost effective.

FEDSIM examined options involving the replacement of these lines with digital data transmission at 56 Kbps. At these speeds, a typical graphics response of 72,000 characters will require between 13 and 15 seconds if no queues exist. This does not provide the level of turnaround generally associated with interactive processing but may prove acceptable for meeting ALMRS requirements.

Since these lines will have 13 to 15 second transmission times (depending on transmission efficiency), it is important that enough lines be provided at the high activity sites to avoid transmission queues (i.e. to prevent the line from becoming a bottleneck). Based on ALMRS workload forecasts, each graphics terminal will complete a graphics transaction every 15 minutes. Assuming that completion of a transaction requires two complete iterations (to allow refinement of the query), each terminal will need to receive 72,000 characters of data every 7½ minutes on the average. As the number of terminals using the line increases, the average transmission delay grows exponentially because queues become more common. For example, if a 15 second transmission time is assumed, the following average delay (transmission time plus average time in queue) results:

- 5 Terminals - 18 seconds

time is assumed, the following average delay (transmission time plus average time in queue) results:

- 5 Terminals - 18 seconds
- 10 Terminals - 22 seconds
- 15 Terminals - 30 seconds
- 20 Terminals - 45 seconds
- 25 Terminals - 90 seconds

At a load of 30 terminals a total bottleneck exists.

In developing cost estimates for options using 56 Kbps lines, FEDSIM assumes that one line is needed for every 8 to 10 graphics devices (terminals, plotters and hardcopy devices). This will provide an average transmission delay of approximately 20 seconds per graphics transaction. Alphanumeric devices will also use the line. These devices will provide little load on the line but will occasionally experience response delays because of graphic transmission queues. Based on this approach, the following number of 56 Kbps lines will be required in alternatives in which an office remotely accesses processor and storage facilities.

- Independent area offices - 1 per office
- District offices - 3 per office
- State offices - 10 per office

The link configurations used as the basis for developing costs for T-1 lines remain unchanged in the options involving 56 Kbps transmission. However, the unit costs for services are reduced in most cases. FEDSIM developed the following unit costs using AT&T rates as the basis for terrestrial links. FEDSIM did not include options involving 56 Kbps satellite transmission because no vendors currently install earth stations at customer premises for 56 Kbps satellite transmission.

- Multiplexor with 16 lines (e.g. Racal-Milco Omnimux) : $26,000 + $300 per year maintenance
- DSU/CSU (e.g. AT&T 2500 DSC) : $1,000 + $50 per year maintenance
- Local lines that are not linked to a long distance line - $480 + $3 per mile per month + $560 installation (or $260 per month + $560 installation if located in the same city as the RBOC switching center)

- Local lines that are part of a long distance line : $354 + $3 per mile per month + $288 installation (or $126 per month + $288 installation if located in the same city as the AT&T switching center)

- AT&T center connection : $50 per month + $224 installation

- Long distance lines : $1,325 + $1.60 per mile per month

FEDSIM again used a 40 percent discount factor in applying these unit costs to develop the communications cost estimates. It is very important to reiterate that achieving this level of discount may be difficult because only a limited number of suppliers can meet potential ALMRS requirements for 56 Kbps digital transmission.

The cost estimates developed by FEDSIM based on the use of 56 Kbps lines are shown in the following tables:

- Table D-11: Distribution to District Offices - 56 Kbps Terrestrial

- Table D-12: Distribution to State Offices - 56 Kbps Terrestrial

- Table D-13: Centralized at DSC - 56 Kbps Terrestrial

I. ANALYSIS SUMMARY

Table D-14 is a comparative summary of the variable costs of each alternative. The table lists alternatives ordered by costs and presents the cost differential between each alternative and the approach with the lowest cost.

Table D-14 shows that the alternative involving distribution of processing and storage to the area office level represents the most cost effective configuration. All alternatives based on the use of T-1 speed lines to minimize transmission delays are significantly more expensive than the area office distribution approach. The centralized use of DSC and the distribution of processing and storage only to the State level are not cost effective even when 56 Kbps lines are used. The remote location of many BLM sites is a deterrent to cost effective high speed communication. Distribution to the district office level (i.e. no processors or storage at the area offices) with communications at 56 Kbps is the only case in which high speed communications becomes reasonably cost effective.

Based on the results of this analysis, FEDSIM recommends that BLM consider the alternative of distribution to the area office as the preferred ALMRS configuration. This alternative is cost effective and eliminates any transmission delays between ALMRS sites. This alternative can also be established using

COST /FISCAL YEAR

COST ELEMENT	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
DISK STORAGE	$11,010,300	$0	$0	$0	$0	$0	$0	$0	$11,010,30
OFFLINE BACKUP	$93,000	$0	$0	$0	$0	$0	$0	$0	$93,00
LOW CAPACITY LINES	$511,398	$251,754	$251,754	$251,754	$251,754	$251,754	$251,754	$251,754	$2,273,67
HIGH CAPACITY LINES	$3,506,036	$1,284,938	$1,284,938	$1,284,938	$1,284,938	$1,284,938	$1,284,938	$1,284,938	$12,500,60
SITE PREPARATION	$2,120,000	$0	$0	$0	$0	$0	$0	$0	$2,120,00
SPACE LEASE/UTILITIES	$954,000	$954,000	$954,000	$954,000	$954,000	$954,000	$954,000	$954,000	$7,632,00
DISK/BACKUP MAINTENANCE	$925,275	$925,275	$925,275	$925,275	$925,275	$925,275	$925,275	$925,275	$7,402,2
			$0	$0	$0	$0	$0	$0	
TOTAL	$19,120,009	$3,415,967	$3,415,967	$3,415,967	$3,415,967	$3,415,967	$3,415,967	$3,415,967	$43,031,7
P[illegible]T VALUE FACTOR	0.621	0.524	0.513	0.466	0.423	0.385	0.350	0.319	
P[illegible] VALUE COST	$11,873,526	$1,789,967	$1,752,391	$1,591,841	$1,444,954	$1,315,147	$1,195,588	$1,089,693	$22,053,1

VARIABLE LIFE CYCLE COSTS
DISTRIBUTION = DISTRICT
LINES = 56K TERRESTRIAL

TABLE D-11

COST /FISCAL YEAR -

COST ELEMENT	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
DISK STORAGE	$5,367,600	$0	$0	$0	$0	$0	$0	$0	$5,367,
OFFLINE BACKUP	$93,000	$0	$0	$0	$0	$0	$0	$0	$93,
LOW CAPACITY LINES	$104,994	$61,720	$61,720	$61,720	$61,720	$61,720	$61,720	$61,720	$537,
HIGH CAPACITY LINES	$10,982,144	$3,208,301	$3,208,301	$3,208,301	$3,208,301	$3,208,301	$3,208,301	$3,208,301	$33,440,
SITE PREPARATION	$1,570,000	$0	$0	$0	$0	$0	$0	$0	$1,570,
SPACE LEASE/UTILITIES	$706,500	$706,500	$706,500	$706,500	$706,500	$706,500	$706,500	$706,500	$5,652,
DISK/BACKUP MAINTENANCE	$455,050	$455,050	$455,050	$455,050	$455,050	$455,050	$455,050	$455,050	$3,640,
			$0	$0	$0	$0	$0	$0	
TOTAL	$19,279,288	$4,431,571	$4,431,571	$4,431,571	$4,431,571	$4,431,571	$4,431,571	$4,431,571	$50,300,
PRESENT VALUE FACTOR	0.621	0.524	0.513	0.466	0.423	0.385	0.350	0.319	
PRESENT VALUE COST	$11,972,438	$2,322,143	$2,273,396	$2,065,112	$1,874,555	$1,706,155	$1,551,050	$1,413,671	[illegible]78,

VARIABLE LIFE CYCLE COSTS
DISTRIBUTION = STATE
LINES = 56K TERRESTRIAL

TABLE D-12

COST /FISCAL YEAR

COST ELEMENT	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
DISK STORAGE	$4,687,200	$0	$0	$0	$0	$0	$0	$0	$4,687,20
OFFLINE BACKUP	$0	$0	$0	$0	$0	$0	$0	$0	$
LOW CAPACITY LINES	$0	$0	$0	$0	$0	$0	$0	$0	$
HIGH CAPACITY LINES	$20,619,848	$9,362,979	$9,362,979	$9,362,979	$9,362,979	$9,362,979	$9,362,979	$9,362,979	$86,159,70
SITE PREPARATION	$1,555,000	$0	$0	$0	$0	$0	$0	$0	$1,555,00
SPACE LEASE/UTILITIES	$699,750	$699,750	$699,750	$699,750	$699,750	$699,750	$699,750	$699,750	$5,598,00
DISK/BACKUP MAINTENANCE	$390,600	$390,600	$390,600	$390,600	$390,600	$390,600	$390,600	$390,600	$3,124,80
			$0	$0	$0	$0	$0	$0	
TOTAL	$27,951,598	$10,453,329	$10,453,329	$10,453,329	$10,453,329	$10,453,329	$10,453,329	$10,453,329	$101,124,9
P[illegible] VALUE FACTOR	0.621	0.524	0.513	0.466	0.423	0.385	0.350	0.319	
P[illegible] VALUE COST	$17,357,942	$5,477,344	$5,362,558	$4,871,251	$4,421,758	$4,024,532	$3,658,665	$3,334,612	$48,508,86

VARIABLE LIFE CYCLE COSTS
DISTRIBUTION = DSC
LINES = 56K TERRESTRIAL

TABLE D-13

ALTERNATIVE/OPTION	VARIABLE TOTAL COSTS	DIFFERENTIAL VERSUS LOW COST ALTERNATIVE	*	VARIABLE PRESENT VALUE COSTS	DIFFERENTIAL VERSUS LOW COST ALTERNATIVE
AREA DISTRIBUTION	$41,173,128	$0	*	$21,542,246	$0
DISTRICT DISTRIBUTION 56K TERRESTRIAL	$43,031,778	$1,858,650	*	$22,053,107	$510,861
STATE DISTRIBUTION 56K TERRESTRIAL	$50,300,285	$9,127,157	*	$25,178,519	$3,636,273
STATE DISTRIBUTION T1 TERRESTRIAL	$84,078,922	$42,905,794	*	$40,128,099	$18,585,853
DISTRICT DISTRIBUTION T1 TERRESTRIAL	$87,170,264	$45,997,136	*	$41,923,864	$20,381,618
DSC DISTRIBUTION 56K TERRESTRIAL	$101,124,901	$59,951,773	*	$48,508,863	$26,966,617
DISTRICT DISTRIBUTION T1 SATELLITE	$151,529,906	$110,356,778	*	$72,362,381	$50,820,135
STATE DISTRIBUTION T1 SATELLITE	$209,639,104	$168,465,976	*	$98,760,262	$77,218,016
DSC DISTRIBUTION T1 SATELLITE	$236,872,161	$195,699,033	*	$111,501,986	$89,959,740
DSC DISTRIBUTION T1 TERRESTRIAL	$254,135,704	$212,962,576	*	$116,522,691	$94,98[illegible]5

COST COMPARISON

TABLE D-14

existing technologies and is consistent with BLM plans for implementing resource management data processing. Distribution of ALMRS ADP to all BLM offices parallels the distribution of workload and responsibilities for land and mineral management. Thus, FEDSIM used this configuration alternative as the basis for subsequent analysis.

FEDSIM also recommends that BLM make a determination regarding whether an average transmission delay of 20 seconds for graphics processing is acceptable. If such a delay will not seriously degrade ALMRS operations, subsequent ALMRS requests for proposals for hardware should allow vendors the option of proposing a configuration based on distribution to the district office level. This approach will allow vendors to evaluate area office to district office communications requirements on a site by site basis to determine if a cost effective solution can be derived using existing technology. For example, the use of direct links (e.g. microwave, fiber optics) for cases in which area and district offices are located in the same city (but not collocated) may prove cost effective.

APPENDIX E

TECHNOLOGY SURVEY

TECHNOLOGY SURVEY

FEDSIM conducted a technology survey to help identify and evaluate ALMRS alternatives. The specific objectives of this survey were to: (1) to determine if the technology exists to provide a cost effective solution to ALMRS requirements; (2) establish the per unit expenditures for ADP and telecommunications components included in the life cycle cost analysis; and (3) develop estimates of how forecasted changes in technology will affect ALMRS life cycle costs.

FEDSIM accomplished this survey by reviewing literature on appropriate technologies, including vendor data provided by BLM. In a few cases, vendors were contacted to obtain additional information. FEDSIM minimized vendor contact because the purpose of the survey was to determine general offerings and trends rather than to conduct a comparative analysis of specific vendor products.

A. SURVEY RESULTS SUMMARY

FEDSIM determined that the technology exists to meet ALMRS requirements and that in most cases there is a competitive environment for providing needed capabilities. A major exception is the case of high speed digital communications lines which are required if BLM elects not to pursue the recommended alternative based on distributed processing (see Appendix D). In this case, AT&T provides the broadest geographic coverage for high speed digital terrestrial lines and also offers the only viable satellite based approach.

FEDSIM used current prices offered by vendors as the basis for developing unit cost figures. These unit costs were established based on the technology review process. This approach represents a very conservative estimating technique since the survey results indicate that general ADP equipment costs will continue to decrease based on technological considerations. As noted in C.C. Gotlieb's book entitled "The Economics of Computers", the average decrease in cost for ADP building blocks (e.g. gates, flip-flops) over the last 25 years has been about 22 percent per year. This cycle cannot continue indefinitely, but most experts believe that component cost decreases will continue through the decade. The unit costs used by FEDSIM should be considered an upper bound which, with a high degree of confidence, can be expected to decline.

B. SURVEY DETAILS

The four areas which have a major impact on ALMRS life cycle costs: (1) processors, (2) online storage, (3) graphics terminals, and (4) communications. The following subsections discuss current offerings and projected technology in these four areas.

1. Processors

a. Current Offerings. FEDSIM used the Digital Equipment Corporation (DEC) VAX series as the basis for developing unit costs for processors since DEC offers a family of compatible CPU's which are widely used in graphics applications. A particular vendor's offerings were used to develop representative unit costs and do not represent a recommendation by FEDSIM of specific products. As shown in Table E-1, three major vendors (DEC, IBM, and Data General) offer comparable products. Many other suppliers could also establish appropriate configurations.

The purchase price for these basic processors (without additional memory, channels, etc.) is shown below.

- VAX 11/785 - $195,000
- VAX 11/750 - $ 54,000
- VAX 11/730 - $ 21,500

These prices were used as the basis for developing the processor configurations included in the cost estimates.

b. Projected Technology. FEDSIM estimates that actual ALMRS processor costs will be less than those used in the cost estimates. To obtain a historical perspective, FEDSIM reviewed:

- Data Processing Technology and Economics, M. Phister
- Mainframe Maneuvers, DATAMATION, February 1984
- Price lists and performance summaries

The review indicated that the price to performance ratio of CPU's has improved by nearly 60 percent per year. For example, in 1972 IBM's 370/168 processor cost over $7 million. The IBM 3033, a processor with twice the power of the 370/168, cost about $3.8 million in 1979. IBM's current offering with power similar to the 3033 is the IBM 4381-3, costing less than $800,000.

The price decrease for smaller processors has been even more dramatic, with the introduction of microprocessors. This trend can be expected to continue and have a major effect on the smaller processors required by ALMRS. The advent of the microsupermini should lead to a significant reduction in processor costs.

Microsuperminis are machines with much of the power of board-based products which sell at much slimmer margins

ALMRS Type	Typical Number of Users Supported	Typical Disk Storage Supported (GB)	DEC Processor	IBM Processor	Data General Processor
A	140	16.2	11/785	4381-1	MV/10000
B	64	3.8	11/750	4361-4	MV/8000
C	12	1.8	11/730	4361-3	MV/4000

TYPICAL VENDOR PROCESSORS

TABLE E-1

because of technology improvements and market pressures. DEC introduced a forerunner in this class, the MicroVAX II, in May 1985. This processor offers more power than the VAX 11/750 for less than half the price. However, the MicroVAX II has limitations in the amount of disks and number of ports it can support so it cannot yet be used as a basis for developing ALMRS cost estimates.

Analysts forecast that DEC will alleviate these limitations when it announces the MicroVAX III in 1986. Data General, a major DEC competitor, is also planning to release microsuperminis. At the high end, an MV12000 is planned. This machine is forecasted to have sufficient processing power to support ALMRS sites (Type A) with high workload. The response to the MicroVAX series will be called the Micro Eagle. Other vendors such as Prime may also enter the microsupermini market.

2. Online Storage

a. Current Offerings. FEDSIM used typical disk storage devices offered by several vendors as the basis for developing a price of $45,000 per gigabyte (GB) of online storage. This price includes controllers and actual storage modules configured to eliminate single point failures. This means that at sites with lower storage requirements, multiple units with .5 GB to .8 GB are used rather than single larger units. Representative units include:

- IBM 3370, 3375
- DEC RA81
- Data General - 6214

At state offices, larger capacity units such as the IBM 3380 could be used.

b. Projected Technology. FEDSIM projects that costs will decrease slightly. More significant decreases could occur if emerging technologies such as optical storage or vertical recording are refined and become commercially available on a widescale basis.

As with most ADP technologies, the costs for storage using large moving head devices have continued to decrease. The capacity of one square inch of disk surface has increased by an order of magnitude between 1970 and 1985. Major events have included the introduction of Winchester disk systems in 1973. Winchester disk systems significantly increased disk system reliability because they are completely closed from the outside environment. In 1980, thin magnetic films were introduced. Thin magnetic films allow higher recording density which allowed tolerances in mechanical systems to become even finer. Experts predict that a quadrupling of current densities by the end of the decade is likely. Higher recording densities coupled with reductions in controller devices can be expected to reduce disk storage costs.

Optical storage technology has received a great deal of recent publicity. Optical disks were originally designed for recording music and resemble standard phonograph records. Information is recorded on the optical disks by a laser which burns information onto the disk surface. Various recording methods exist and each has advantages and drawbacks.

Optical read-only memory (OROM) devices are readily available but the data on these devices must be premastered (i.e., data must be put on the devices at the production site) and is unchangeable.

Write-once-read-many (WORM) devices are becoming more prevalent. These devices allow for user writing of data but, once written, this data is also unchangeable. Phase-change technology allows for erasing and overwriting data, but there are accompanying difficulties. The bit error rate of this medium is high, typically one error per every 10,000 bits stored. The recording surface is very sensitive to ambient temperature changes so special environmental control is required.

The WORM devices offer some potential for use by ALMRS for storing portions of the data base such as basic coordinate data which is relatively static. The advantage of this storage technology is its lower price, with $2,000 per GB being a typical value as opposed to about $20,000 - $30,000 per GB for conventional disks (without controllers).

New technologies such as thermo-magnetic-optic (TMO), offer the potential for erasability without the error rates and temperature sensitivity of current phase-change technology. If such devices become commercially viable, the whole data processing storage industry will be revolutionized and ALMRS will achieve significant life cycle cost reductions compared to forecasts. Current vendors of optical disk technologies include Kodak and its subsidiary Verbatim Corporation, 3M, Optotech, Hitachi, and Information Storage, Inc.

Vertical recording is a technique for significantly increasing the density of storage using disk and tape media similar to those currently in use. Vertical recording changes the arrangement of particles on the media and theoretically allows for a twenty-fold increase in current densities. This technique is still in the research and development stage but is being explored by major vendors including IBM, Sperry, and Hewlett-Packard.

3. Graphics Terminals

a. Current Offerings. FEDSIM used a unit price of $35,000 for the graphics terminals (also commonly referred to as graphic workstations) required by ALMRS. The terminals used as the basis for cost estimation provide the following general capabilities:

- High speed channel interface
- 1024 x 1024 pixel resolution
- 19 inch screen
- 256 colors
- features including zoom, rotate, arc, circle, ellipse, curve generation, pan, blink, highlight, reverse video.

Representative offerings include the HASP 9816, Graphics Information Inc. (GII) workstation, and Megatek Whizzard 3375.

b. Projected Technology. Graphic terminals contain internal processors and software capabilities. This is consistent with the trend in graphics terminals over the past two decades. The continuing trend has been to distribute more of the intelligence required in graphics applications from the host to the graphics terminal. This relieves the host from performing highly repetitive resource consuming subroutines that can be more efficiently performed by graphics terminal hardware, firmware, and software.

The first generation of graphics terminals had all processing performed by a host processor and used vector refresh displays. Subsequent generations replaced the displays with raster devices. The graphics terminals provided local intelligence processing of display memory mapping, storing resulting display data, and continually refreshing the display. Current graphics terminals perform many other functions previously assigned to the host including data base management, graphics generation from host-supplied alphanumeric data, mathematical transformations of data, and local user functions such as pan, zoom, and selective editing. This type of local intelligence will support the ALMRS concept of calculated graphics and will allow for reduction in host processing and data storage requirements.

FEDSIM estimates that the unit costs of graphics devices will decrease slightly due to technology improvements. Market pressures are driving vendors in research and development to technologies that will reduce graphics terminal processor, memory and monitor costs. Most experts predict that vendors will continue to unveil systems with increasing local processing capability. This will provide for an even wider range of competitors for supplying the devices needed by ALMRS.

4. Communications

a. Current Offerings. FEDSIM used AT&T rates for dedicated voice grade lines between sites for transfer of data base updates and used AT&T WATS rates for access to interfacing systems from each site. There are no high speed digital service lines in the alternative configuration recommended by FEDSIM (see Appendix D).

The cost of communications is dependent on the availability of service centers provided by various vendors. Table E-2 compares the available service centers provided by AT&T and its two major competitors in supplying dedicated lines; MCI, and GTE Sprint. The chart shows service center cities in the nine BLM states where communications service is somewhat limited (Eastern States and California are excluded). The geographic coverage provided by AT&T far exceeds that of its competitors.

Table E-2 also shows the coverage for the GEONET private packet switch network recently implemented by the Department of Interior. This network currently supports only three nodes in ALMRS cities. However, the public network provided by TYMNET which is part of the GEONET umbrella does provide widespread coverage in ALMRS cities. The service supplied by TYMNET is switched rather than dedicated and is limited to 1200 bits per second in many cities. However, this may suffice for ALMRS data transfer. A detailed analysis needs to be conducted once GEONET rates stabilize and ALMRS requirements are further detailed in terms of communications traffic patterns.

b. Projected Technologies. Changes in communications technology through the end of the decade are expected to involve reduced costs and capabilities for satellite links, local area networks, and fiber-optic links. Improvements in satellite capabilities are not expected to impact ALMRS. Satellite communications are cost effective when transmission involves many channels between major cities which are far apart. The ALMRS requirements are generally for single channels between remote locations which are within the same state and thus satellite communications are not a cost effective solution.

	SUPPLIER				
ALMRS State	AT&T	MCI	GTE Sprint	GEONET Private	TYMNET Public
Arizona	Flagstaff			Flagstaff	
	Phoenix*	Phoenix*	Phoenix*		Phoenix*
	Prescott				
	Tucson	Tucson			Tucson
	Yuma*				
Colorado	Col.Springs				Col.Springs
	Denver*	Denver*	Denver*	Denver*	Denver*
	Ft. Collins				
	Ft. Morgan				
	Grand Junction*				
	Greeley				Greeley
	Montrose*				
	Pueblo				Pueblo
Idaho	Boise*			Boise*	Boise*
					Idaho Falls*
	Pocatello*				Pocatello*
	Twin Falls				
Montana	Billings*				Billings*
					Bozeman
					Butte*
	Glendive				
					Great Falls*
	Helena				
	Missoula*				Missoula*
Nevada	Carson City*				
	Las Vegas*	Las Vegas*			Las Vegas*
	Reno*	Reno*			Reno*
New Mexico	Albuquerque*	Albuquerque*		Albuquerque*	Albuquerque*
	Las Cruces*				Las Cruces*
	Roswell*				
	Santa Fe*				Santa Fe*
Oregon					Eugene*
	Medford*				Medford*
	Pendelton				
	Portland*	Portland*	Portland*		Portland*
					Salem*
Utah	Logan				
	Ogden				Ogden
	Provo				Provo
	Salt Lake*	Salt Lake*			Salt Lake*
Wyoming	Casper*				Casper*
	Cheyenne*				

* BLM Office

VOICE GRADE SERVICE CENTERS

TABLE E-2

The use of local area networks (LANs) is continuing to expand as progress is made in developing a complete definition of universal digital communication standards. The major impact of LANs for ALMRS will not be associated with intersite communications. LANs could reduce the costs of providing the interface at a site between host processors and graphics terminals. In order to be effective, this interface must be achieved via a high speed link. FEDSIM included the cost of high speed processor buses in the cost estimates. LANs may prove more cost effective especially at state offices, where an average of nearly eighty graphics terminals must be supported.

New distance records for fiber-optic lines continue to be set. In 1984, laboratory tests resulted in transmission of data at 2 GB per second over 80 miles without repeaters. In addition, transmission over 125 miles without repeaters at a lower speed of 420 megabits per second, was achieved. The use of fiber-optic technologies offers two areas of potential cost savings for ALMRS. First, the use of fiber-optics by telephone companies in providing local and long lines can be expected to reduce current rate structures. Secondly, it is likely that fiber optics will be cost effective for directly connecting ALMRS district and area offices that are not collocated but are located in the same city.

APPENDIX F

METHODOLOGY AND ALGORITHMS FOR CALCULATING BENEFITS

METHODOLOGY AND ALGORITHMS FOR CALCULATING BENEFITS

The ALMRS Project Office compiled initial workload data and information describing the current land and mineral system, including case processing, status, records maintenance, management reporting and statistics, and query activities. A similar description of the proposed ALMRS also was prepared.

BLM's present and future system documents were used as a starting point to generate and refine system sizing, conceptual design, and costing for the proposed automated system. FEDSIM prepared Functional Requirements and Cost Estimates for ALMRS. Cost documents were revised to reflect refined functional requirements, collocated offices, residual value of system hardware, and revised projections for the system life cycle.

Benefits were derived from the BLM present and future system documents and the FEDSIM functional requirements. Several iterations of benefit estimates were performed and subjected to peer, management, and field verification. Each iteration focused more sharply on user groups and how they use the records and perform their jobs, work functions, and system functions.

ALMRS Project personnel worked directly with selected managers, a large group of Land and Minerals field office representatives, and users from the Headquarters office to define the functional flow of land and mineral activities presently performed and to define how these activities will be accomplished in the new system. Times, costs, and cost differences were estimated and verified against present system costs documented in financial management reports.

The ALMRS Project Office initial report on costs, impacts, and benefits was presented to a small management group, including state, district, and resource area managers. Comments resulting from this management review were incorporated in the report.

Three teams were formed at the Project Management Office to verify and validate data used to define and formulate system requirements in the present and automated (future) land and mineral record and case processing environments. Each team visited one of the following states: Colorado, Montana, or Arizona. These states were chosen because they represent high, medium, and low record and land and mineral work activity in BLM. Each team interviewed appropriate staff members responsible for land and mineral activities at state, district, and resource area offices. Cost impacts were corroborated or refined estimates were derived from previous studies. Interviews focused on the following points of interest: number of users and location of contact with the records system; information used for alphanumeric and graphics; and time estimates of how the user utilizes the records system. The user groups were divided into three categories: (1) BLM; (2) other federal agencies (e.g., Bureau of Indian Affairs, Bureau of Reclamation, etc.); and (3) non-federal users, such as state and local governments, industrial and commercial concerns, and the general public.

After the review process in the states was completed, the team notes were consolidated into a uniform set of data which was used to quantify the present and future system costs/benefits.

In each state, a generic case for lands as well as minerals was defined and presented as a discussion case. A typical case for lands was a moderately involved right-of-way (not complex); for minerals the typical case was an oil and gas case. After the state verification process, it was established that the variation among the states was not pronounced and that the results could be consolidated into a consistent set of data representing the BLM Land, Mineral, and Status Record Management System as a whole.

The three BLM teams gathered time estimates for various Bureau work functions. These time estimates were used to establish dollar values for each functional area of records management. These functional areas are: (1) Pre-application processing; (2) case receiving; (3) assistance to users; (4) non-case activity (record notations); (5) pre-authorization (research status, qualified users); (6) post-authorization (compliance, payments, case activities, and assignments); (7) management reports and statistics; and (8) inquiry response.

The dollar value for each activity in the automated system was obtained by determining the amount of time the function will take with the automated ALMRS system. The differences between the present and the automated systems represent the savings (or cost avoidance) of each function.

Each of these functions is explained in the algorithms and related text included in this Appendix. The dollar value for each unit of measure was obtained by multiplying each of the following successive items: the number of units (cases, plats, etc.); time per unit (minutes, work months); and cost per time unit (e.g., $3,200 per work month).

Workload estimates are based on:

(a) New case base of 21,000 (5,000 lands and 16,000 minerals) in 1985 excluding mining claims.

(b) New mining claim filings of 130,000 in 1985.

(c) An active case population in 1985 of 220,000 of which 110,000 - 173,000 will require some processing during the year (excluding mining claims). This figure includes 43,000 lands and 130,000 minerals cases.

(d) Annual processing of all 1,400,000 unclosed mining claims, i.e., annual assessment or notice of intent to hold action.

(e) Summary of Case Workload for Base Year 1985 (excludes active cases not requiring processing).

Summary of Case Workload for Base Year 1985 - (excludes active cases not requiring processing).

	New	Pending	Total
Lands	5,000	43,000	48,000
Minerals	16,000	130,000	146,000
Total	21,000	173,000	194,000
Mining Claims	130,000	1,400,000	1,530,000
Total	151,000	1,573,000	1,724,000

Labor costs used for all beneficiary users (Bureau, other federal, and non-federal) are based on the following:

Time:
* 52 weeks x 40 hours/week =2,080 hours
*10 Workmonths (excludes holidays and leave) 10/12 =0.833 work parts/yr.
*Working hours, per yr. 2080 x .8333 =1733.3 work hr./yr.
*1733.3 workhours/10 WM =173.3 work hour/WM
Work minutes per WM = 173.3 x 60 = 10,398 workmin/workmonth
*Workdays 52 x 5 x .8333 =216.67 workdays/WM
216.67 WD/10WM =21.67 workdays/WM
*Office open days: 52 x 5 (10 holidays) =250 office days/year
*Workhours per office day 1733.3/250 =6.93 workhours/office day

Costs:

*BLM Direct Labor Cost (Including fringe benefits, e.g., health, retirement, life insurance, etc.)	$27,350.00/yr.
*Leave Surcharge Benefits (Including S/L, H/L, A/L, Admn./L.	4,650.00/yr.
*Labor with Fringe	$32,000.00/yr.
*BLM Cost W/M Direct Labor $27,350/10	$ 2,735.00/WM
Fringe $4,650/10	465.00/WM
*Direct and Fringe $32,000/10	$ 3,200.00/WM
*Equivalents (3,200 x 10)/250 ofc day	128.00/ofc. day
3,200/21.67 day/WM	147.67/work day
3,200/173 hr./WM	18.50/work hr.
3,200/173/60 min./hr.	0.31/work min

ALGORITHMS USED FOR CALCULATING QUANTIFIABLE BENEFITS

A.1 - A.4 Assist Public Prior to Filing of an Application

Narrative

Prior to the filing of an application, assistance is requested by the prospective applicant for basic information pertaining to the type of land use authorization, right-of-way, oil and gas lease, etc. These requests are received by way of walk-ins, mail, and phone inquiries.

It is estimated that out of 21,000 applications filed annually, 5% pre-application assistance requests are received. Most of the assistance to these prospective applicants is handled by BLM State Office, District Office and Resource Area personnel, including records personnel, land law examiners, public room assistants, managers, resource specialists, geologists, petroleum engineers, and realty specialists.

Personnel Functions:

- Assist user in defining basic filing requirements.
- Assist in land description information.
- Assist in obtaining lease information.
- Analyze data prepared by applicant to determine that it meets all requirements, e.g., Application for Permit to Drill.

Present Manual System

With the present manual system, BLM personnel must retrieve information from numerous locations to provide assistance to the public. The information is retrieved by manually pulling cadastral survey plats, general ownership and status plats, legal documents, and case files and by researching appropriate regulations for filing requirements. After these manual records are used to assist in answering each request, they must be refiled.

Since most of the current information is located in the State Offices, it is often necessary for the District Office or Resource Area Offices to call the State Office for information to answer these requests. It often takes several calls and at least one day to provide most of the information.

A.1 - A.4 (continued)

Proposed Automated System

With an automated system, all current land and mineral records and case file information will be available immediately at any terminal site in any BLM State Office, District Office or Resource Area Office. The automated system will be designed to allow the user to locate required information with a minimum of BLM personnel assistance.

Computation figures for this benefit are detailed on the following pages.

Benefits Summary

The amount of savings in BLM personnel time will be due to having all current necessary information available in one location in all BLM offices. Also, a percentage of the information required for requests will be available to the user with no BLM personnel assistance.

A.1 - A.4 Assist Public Prior to Filing of an Application

Algorithm:

LANDS

ALPHANUMERICS

Present
5,000 new applications
x .05 request assist. = 250 requests
x 105 minutes/application
x $0.31/minute = $8,138

Future
5,000 new applications
x .05 request assist. = 250 requests
x 15 minutes/application
x $0.31/minute = $1,163

NET SAVINGS - A/N = $6,975 (A.1)

GRAPHICS

Present
5,000 new applications
x .05 request assist. = 250 requests
x 90 minutes/application
x $0.31/minute = $6,975

Future
5,000 new applications
x .05 request assist. = 250 requests
x 15 minutes/application
x $0.31/minute = $1,163

NET SAVINGS - GRAPHICS = $5,812 (A.2)

MINERALS

ALPHANUMERICS

Present
16,000 new applications
x .05 request assist. = 800 requests
x 55 minutes/application
x $0.31/minute = $13,640

Future
16,000 new applications
x .05 request assist. = 800 requests
x 6 minutes/application
x $0.31/minute = $ 1,488

NET SAVINGS - A/N = $12,152 (A.3)

GRAPHICS

Present
16,000 new applications
x .05 request assist. = 800 requests
x 50 minutes/application
x $0.31/minute = $12,400

Future
16,000 new applications
x .05 request assist. = 800 requests
x 10 minutes/application
x $0.31/minute = $ 2,480

NET SAVINGS - GRAPHICS = $ 9,920 (A.4)

The minutes in each equation comprise the amount of time the individuals identified above estimated they would spend on a typical case. The cost of $0.31/per minute is derived from a fully loaded (fringe benefit and leave) workmonth of $3,200.

SUMMARY

		Present System	Future System	Benefit
A.1 Land:	Alphanumeric	$ 8,138	$ 1,163	$ 6,975
A.2	Graphic	6,975	1,163	5,812
	TOTAL LAND	$15,113	$ 2,326	$12,787
A.3 Mineral:	Alphanumeric	$13,640	$ 1,488	$12,152
A.4	Graphic	12,400	2,480	9,920
	TOTAL MINERAL	$26,040	$ 3,968	$22,072
	TOTAL	$41,153	$ 6,294	$34,869

A.5 - A.8 Receive Applications

Narrative

The Bureau is the only agency in the Federal Government which has mineral leasing authority (Mineral Leasing Act of 1920). Although other agencies do have certain land use authority, BLM has a multitude of Acts which allow land use authorizations, e.g., right-of-way, color-of-title, land classification, etc., and leases all Federal mineral interests for all agencies.

The filing and processing of these applications initiate the Bureau's land and mineral program. There are also many associated functions including appeals, protests and litigation files. BLM records personnel and accounting technicians are involved in this initial process.

Personnel Functions

- Determine acceptability of application.
- Serialize.
- Create Serial Register Page.
- Note numerous cuff records (outlined in BLM Manual 1274).
- Assemble case file.
- Validate and deposit monies received.
- Note records (plats in most cases).
- Docket case file to await further processing.
- Notify adjudication of establishment of new cases.

Present Manual System

When an application is filed with BLM, a determination must be made as to whether it is unacceptable and returned to the applicant or acceptable. If the application is acceptable, it continues through the case serialization process which includes assigning a serial number, assembling a case file, noting numerous cuff records and use plats, and sending the case file to docket to await adjudication.

Proposed Automated System

With an automated system, most of the serialization process, money validation, and transfer or deposit will be automated. The initial information, as well as the progress on case work, will be available at more locations and accessed quicker by eliminating numerous manual searches. This information will be available immediately at any terminal site in any BLM State Office, District Office or Resource Area Office. The automated system will be designed with menus to ease the locating of required information.

Computation figures for this benefit are detailed on the following pages.

A.5 - A. 8 (continued)

Benefits Summary

The savings of BLM personnel time will be due to computer assistance in determining application acceptability, assigning case files with serial numbers, and the typing of serial register pages. Accounting advice forms will no longer have to be typed, and the calculation of acreages to determine if enough money was filed with the application will also be automated. The plats will be automatically noted and adjudication will be automatically notified of the establishment of new cases. This process will also automate the call-up (Future Action Suspense) forms, so that BLM personnel will no longer have to maintain tickler files for required future actions.

A.5 - A.8 Receive Applications

Algorithm:

LANDS

ALPHANUMERICS

Present
5,000 new applications
x 15 minutes/application
x $0.31/minute = $23,250

Future
5,000 new applications
x 5 minutes/application
x $0.31/minute = $ 7,750

NET SAVINGS - A/N = $15,500 (A.5)

GRAPHICS

Present
5,000 new applications
x 15 minutes/application
x $0.31/minute = $23,250

Future
5,000 new applications
x 5 minutes/application
x $0.31/minute = $ 7,750

NET SAVINGS-GRAPHICS = $15,500 (A.6)

MINERALS

ALPHANUMERICS

Present
16,000 new applications
x 15 minutes/application
x $0.31/minute = $74,400

Future
16,000 new applications
x 5 minutes/application
x $0.31/minute = $24,800

NET SAVINGS - A/N = $49,600 (A.7)

GRAPHICS

Present
16,000 new applications
x 15 minutes/application
x $0.31/minute = $74,400

Future
16,000 new applications
x 5 minutes/application
x $0.31/minute = $24,800

NET SAVINGS-GRAPHICS = $49,600 (A.8)

SUMMARY

		Present System	Future System	Benefit
A.5 Land:	Alphanumeric	$23,250	$ 7,750	$15,500
A.6	Graphic	23,250	7,750	15,500
	TOTAL LAND	$46,500	$15,500	$31,000
A.7 Mineral:	Alphanumeric	$74,400	$24,800	$49,600
A.8	Graphic	74,400	24,800	49,600
	TOTAL MINERAL	$148,800	$49,600	$99,200
	TOTAL	$195,300	$65,100	$130,200

Narrative

A.9 - A.12 Pre-Authorization Case Processing

The pre-authorization process is that portion of case processing which occurs after the case file is docketed awaiting adjudication as outlined in A.5 - A.8 Receive Applications.

Land and Mineral cases are requested from docket by adjudication to begin the next step in the process. This portion of the process involves a review of the application to determine if the applicant meets the qualifications, the land description on the application is checked against the land status, a determination must be made as to the availability of the requested lands or interests involved, required appraisals requested and prepared, application of the applicable Acts, regulations, decisions and policies to determine if there are any constraints or conditions prohibiting issuing the requested use authorization. When a determination is made that the applicant will not be issued a requested authorization, the application is formally rejected with the right of appeal to the Interior Board of Land Appeals (IBLA). If a determination is made to issue the authorization, the District or Area Offices recommend the appropriate stipulations to be attached to the authorization for surface protection, if applicable, the appropriate forms are typed, the records are noted. The monies involved are transferred from the surplus account and either deposited or transferred to the appropriate agency, state or counties.

The adjudicative process is a lengthy and sometimes tedious job which involves interpretation and a great deal of legal research. The process is complex with all the potential conflicts that can arise and overlaps which occur in a requested area. The process becomes very time consuming to just try to separate those areas (in one application) that will be authorized for use, areas that will be suspended pending further action and those areas that will be rejected. This issue is discussed under both the present manual system and the proposed automated system.

The BLM personnel involved in this area are adjudication personnel, resource personnel, appraisers, and records personnel.

Personnel Functions

- Prepare appropriate land descriptions.
- Research status records, e.g.,
  - ownership
  - potential conflicts
  - availability of federal interests.
- Request and receive case data.
- Field Reports (Resources).
- Request and prepare appraisals.
- Other agency reports.
- Stipulations.
- Legal Research
- Issue authorizations/decisions (Standardized formats and wording)

A.9 - A.12 (continued)

Present Manual System

The present manual system requires BLM personnel to visit numerous locations to gather the needed information. The documents needed must be pulled and refiled after their use. Because the majority of the information is centralized in the State Offices, the District and Area Office personnel must call the State Offices for the information. This often entails several phone calls and can take several days to receive the needed information. The area of application must now be checked manually against the status plats. It is often times necessary to use colored pencils to distinguish the overlap area or areas within a single application that will be partially suspended, partially authorized and partially rejected. All these actions must also be manually noted to the records. Although the legal libraries are automated, much of the adjudication legal material is not. Often times, it is difficult to find all the material pertaining to a particular issue. With the present manual system, the District and Area Offices must be notified of an application so they can determine the appropriate stipulations, then contact the adjudicator to recommend which stipulations need to be attached to the authorization document. The monies collected by BLM must be deposited and an accounting advice form typed up and sent to the appropriate office.

Proposed Automated System

With an automated system, all current land and mineral records and case file information will be available immediately at any terminal site in any BLM State, District or Resource Area Office. The automated system will be designed with a series of menus to assist the user in locating required legal material. Although the application of the various Acts, regulations, precedent decisions and policies does not lend itself to automation, many areas that assist in this process do. The automation of adjudicative tools will save time in the processing of cases. Land descriptions in applications will be compared with the legal land description in the computer and the differences, if any, listed for the BLM personnel processing the application. Ownership of Federal interests will be checked by the computer. If the land applied for is not federally owned, the computer will so identify. If lands or interests are federal, the computer will compare and indicate potential conflicts or bars to authorizing use of the interest applied for, e.g., lands included in a withdrawal or a previous authorization.

Appropriate stipulations for the lands involved will also be obtainable directly from the computer or other agency data by telecommunications to and from the appropriate agency.

Computation figures for this benefit are detailed on the following pages.

A.9 - A.12 (continued)

Benefits Summary

The amount of savings in BLM personnel time will be due to having all current necessary information available in all BLM offices. BLM personnel will no longer have to manually search for conflicts between the application area and the status plats, check land descriptions, or use colored pencils to separate and identify overlap areas. BLM personnel will save time by having legal research material immediately available by subject or issue. BLM personnel will no longer have to pull information documents and then refile them after use.

A.9 - A.12 Pre-Authorization Case Processing

Algorithm:

LANDS

ALPHANUMERICS

Present
26,000 new applications
x 430 minutes/application
x $0.31/minute = $3,532,450

Future
25,000 new applications
x 258 minutes/application
x $0.31/minute = $2,119,470

NET SAVINGS - A/N = $1,412,980 (A.9)

GRAPHICS

Present
26,000 new applications
x 190 minutes/application
x $0.31/minute = $1,560,850

Future
26,000 new applications
x 114 minutes/application
x $0.31/minute = $ 936,510

NET SAVINGS-GRAPHICS = $ 624,340 (A.10)

MINERALS

ALPHANUMERICS

Present
81,000 new applications
x 120 minutes/application
x $0.31/minute = $3,013,200

Future
81,000 new applications
x 60 minutes/application
x $0.31/minute = $1,506,600

NET SAVINGS - A/N = $1,506,600 (A.

GRAPHICS

Present
81,000 new applications
x 90 minutes/application
x $0.31/minute = $2,259,9[illegible]

Future
81,000 new applications
x 40 minutes/application
x $0.31/minute = $1,004,400

NET SAVINGS-GRAPHICS = $1,255,500 (A

SUMMARY

		Present System	Future System	Benefit
A.9	Land: Alphanumeric	$ 3,532,450	$2,119,470	$1,412,980
A.10	Graphic	1,560,850	936,510	624,340
	TOTAL LAND	$ 5,093,300	$3,055,980	$2,037,320
A.11	Mineral: Alphanumeric	$ 3,013,200	$1,506,600	$1,506,600
A.12	Graphic	2,259,900	1,004,400	1,255,500
	TOTAL MINERAL	$ 5,273,100	$2,511,000	$2,762,100
	TOTAL	$10,366,400	$5,566,980	$4,799,420

A.13 - A.16 Post Authorization Case Processing.

Narrative

The post-authorization process and maintenance is that portion of case processing that occurs after a use is authorized. In the case of mineral leases, this part of the process involves boundary assignment processing, Applications for Permit to Drill (APDs) processing, inspection and enforcement of safety requirements at the well sites, payment tracking with the Minerals Management Service, transferring of case files and information between BLM and MMS as mineral leases go in and out of production, and other case-related activities, such as unit agreements, communitization agreements, etc.

On land cases, this area involves compliance checks, rentals, reappraisals, cost recovery issues, etc.

The personnel involved in this workload are accounting technicians, adjudication, records, resources, appraisers, and realty specialists.

Personnel Functions

- Track payment data.
- Monitor compliance.
- Process/track assignments.
- Request and receive case data (using formatted requests).
- Aid in preparation of SIMO activity.
- Process APDs.
- Well description and enforcement regulations.
- Process unit and communitization agreements.

Present Manual System

In the present manual system all bonding information is kept and updated on typed 3 x 5 cards. In the OPEC states, this represents a heavy workload. It is extremely difficult to connect bonds with specific leases. It involves a heavy paper workload to notify by memo all other BLM offices of land acceptance and updated information. This also involves a surety list (firms authorized to issue bonds) published and updated by notices in the Federal Register against which each office must check its sureties.

The processing of assignments is BLM's heaviest workload. This entire process is accomplished manually.

An area of great concern involves the monies and case files that are shifted between BLM and MMS. Because BLM has no automated interface with MMS, all transactions must be filled out on forms and physically transmitted to them.

The SIMO program is also a high workload area. All leases that terminate or expire must be manually tracked, aggregated, parcelized, and typed into a SIMO list form. The drawing is then held, and the land descriptions once again typed from the SIMO list on to lease forms.

A.13 - A.16 (continued)

All tracking of unit agreements, communitization agreements, etc., is done manually. All compliance checks are typed on file cards in tickler files and all associated activities on lands and mineral cases which have a use authorization document issued are typed manually.

Proposed Automated System

An automated system will make possible a reduction in processing time in the areas identified above by tracking and displaying all necessary information at one terminal site. It will eliminate all the various typing of cards and maintaining of the numerous tickler files. The automated system will be an invaluable aid in the preparation of the SIMO Oil and Gas List and resulting leases. The automated system will be designed with a series of indicies to assist the user in locating required information with a minimum of assistance.

Computation figures for this benefit are detailed on the following pages.

Benefits Summary

The amount of savings in BLM personnel time will be due to having all current necessary information available in all BLM offices. The amount of time saved in the preparation of the SIMO list is a significant amount.

A.13 - A.16 Post Authorization Case Processing.

Algorithm

LANDS

ALPHANUMERICS

Present:
48,000 cases
x 185 minutes/case
x $0.31/minute = $2,752,800

Future
48,000 cases
x 111 minute/case
x $0.31/minute = $1,651,680

NET SAVINGS - A/N = $1,101,120 (A.13)

GRAPHICS

Present
48,000 cases
x 150 minutes/case
x $0.31/minute = $2,232,000

Future
48,000 cases
x 90 minutes/case
x $0.31/minute = $1,339,200

NET SAVINGS - GR. = $ 892,800 (A.14)

MINERALS

ALPHANUMERICS

Present:
146,000 cases
x 331 minutes/case
x $0.31/minute = $14,981,060

Future
146,000 cases
x 230 minutes/case
x $0.31/minute = $10,409,800

NET SAVINGS - A/N = $ 4,571,260 (A.15

GRAPHICS

Present
146,000 cases
x 205 minutes/case
x $0.31/minute = $9,278,300

Future
146,000 cases
x 155 minutes/case
x $0.31/minute = $7,015,300

NET SAVINGS - GRAPHICS = $2,263,000 (A.16)

SUMMARY

		Present System	Future System	Benefit
A.13 Land:	Alphanumeric	$ 2,752,800	$ 1,651,680	$1,101,120
A.14	Graphic	2,232,000	1,339,200	892,800
	TOTAL LAND	$ 4,984,800	$ 2,990,880	$1,993,920
A.15 Mineral:	Alphanumeric	$14,981,060	$10,409,800	$4,571,260
A.16	Graphic	9,278,300	7,015,300	2,263,000
	TOTAL MINERAL	$24,259,360	$17,425,100	$6,834,260
	TOTAL	$29,244,160	$20,415,680	$8,828,180

A.17 - A.18 Mining Claim Recordation Processing

Narrative

Mining Claim Recordation involves process involves reviewing new applications (claims) for acceptability, accounting for the dollars, and making the proper records notations. In addition, for each of the 1.4 million active claims in the present system, BLM must process an annual assessment statement.

The present system requires 25 minutes to process each new claim and five minutes to process annual actions for each active claim. In the new automated system, the times will be reduced to five and one minute(s) respectively.

The savings stem from typing required information one time at a terminal and then providing the needed information to other computer users. When combined with status, selected adjudication functions will be accomplished by computer programs that search out such questions as:

- Is the land open to entry?
- Are there any restrictions in the area?
- Are there other conflicting uses?

Based on the experience gained since the installation of this system in 1978, the Bureau is aware of improved technology, such as mark-sensing forms, to speed the processing of mining claim recordation and we intend to use these to our advantage.

Personnel Functions:

- Receive the application.
- Review the application for acceptability.
- Type the accounting form.
- Enter the required data into the automated system.
- Establish the case folder.
- Route folder (case file) to adjudication.
- Note records with adjudication's action(s).
- Note assessment statements annually.

Present Automated System

The present automated system for Mining Claim Recordation is the first Bureauwide automated records system. This system is not tied to other computerized systems which use the same data. The data base design does not store the data using the latest technology and the output reports are time-consuming batch runs, some of which are converted to computer output microfilm that is outdated when received in the field.

The old manual processing of mailing out Notice of Assessment Due and Receiving Assessment Statements is now computerized by the Mining Claim Recordation System.

A.17 - A.18 (continued)

Proposed Automated System

The proposed system would integrate the Mining Claim Recordation System with other systems, such as accounting, which will eliminate duplicate data entry. The proposed ALMRS will contain status information, therefore, mining claim cases can be adjudicated without reference to another manual set of records.

The data in the system will be stored more efficiently taking advantage of the latest available technology and the information will be available to field users from terminals located in all BLM and selected other agencies' offices.

The output reports will be restructured to give selected users data pertinent to their need, not the total indices they now receive.

These improvements will enable BLM to reduce the processing time for new and active mining claim cases.

A.17 - A.18 Mining Claim Recordation Processing

Algorithm:

MINERALS

Mining Claim record maintenance:

ALPHANUMERICS

Present
1,400,000 claims
x 5 minutes/claim
x $0.31/minute = $2,170,000

Future
1,400,000 claims
x 1 minute/claim
x $0.31/minute = $ 434,000

NET SAVINGS - A/N = $1,736,000 (A.17)

Receive Mining Claims

ALPHANUMERICS

Present
130,000 claims
x 25 minutes/claim
x $0.31/minute = $1,007,500

Future
130,000 claims
x 5 minutes/claim
x $0.31/minute = $ 201,500

NET SAVINGS-A/N = $ 806,000 (A.18)

SUMMARY

		Present System	Future System	Benefit
	Mineral: Alphanumeric			
A.17	Maintain Case Records	$ 2,170,000	$ 434,000	$1,736,000
A.18	Receive New Cases	1,007,500	201,500	806,000
	TOTAL	$ 3,177,500	$ 635,500	$2,542,000

A.19 - A.20 Reduce KGS Determination Cost

Narrative

There are a number of activities in BLM management of federal lands which have an impact on the records system, particularly those activities mandated by regulations concerning minerals. For example, producing oil and gas wells must be inspected regularly and proposed activities approved before the operator can act. In each of these activities, reports are generated which affect the status of land. Such diverse activities as clear listing parcels proposed for simultaneous drawing; detection of potential drainage of federal lands; approval of Applications for Permit to Drill, Communitization and Unitization Agreements, etc., all require professionals to access diverse data sources. In most states with heavy mineral activity, there is a backlog that can be eased by allowing professionals access to different data bases in a quicker and more efficient manner. The identification of known geologic structures is documented in this section but the information could be applied to almost any other mineral-related activity.

The ALMRS system will provide automated tools such as standard reports and formats, business graphics, and statistical packages. The system will spare managers and professionals from the burden of chasing down stray facts and numbers from scattered sources and then combining the data into usable formats. The information can move more efficiently and be available to more users in a timely fashion.

Present System

The prime responsibility for determining the boundaries of Known Geologic Structures (KGS) rests with BLM geologists in State, District, or Area Offices. The geologists use maps and alphanumeric data from private well-data information sources, the BLM's Land Status Records plats, and information from the U.S. Geological Survey. The geologist uses the Master Title and special use plats to determine where the existing oil and gas leases are located and what affect these leases will have on the KGS determination. Geologists spend approximately 10% of their time reviewing data from different sources. In addition, they use maps generated from proprietary data obtained from private sources to establish locations of oil and gas wells. It takes somewhere between two weeks to two months (average of five weeks) for the geologist to prepare a KGS determination and approval. Mail delivery between BLM State Offices and District Offices takes approximately one week. The reviewers of the KGS determination use the same alphanumeric and graphic products that the geologist used to make the original determination.

A.19 - A.20 (continued)

Automated System

It is envisioned that in the automated system, township land net grid will be generated, and the geologist will have the capability of overlaying mineral ownership status and oil and gas well locations. Statistical tools will be available for keeping track of acreages and locations of KGSs. These tools will be available to handle internal (BLM) management reports and queries from any interested party. Currently, geologists spend approximately 5% of their time daily answering queries concerning KGS or related information. It is envisioned that this time will decrease to somewhat less than 1%. The geologist requires access to well data along with ALMRS data in graphic formats. It is anticipated that ALMRS could have private well data as an external file to meet these requirements. With on-line graphic capability, the time required to complete the KGS determination may be reduced by 50%. With an automated system, communication between any two locations will be performed in on-line, thus reducing the one week required for mailing. Geologists will have access to the most current data for identifying those oil and gas leases that fall in or around the area being worked.

Benefits Summary

The 1.5 million dollars represents a savings in 50% of the time required to determine a Known Geologic Structure (KGS) in the present system. The actual number of cases was estimated from a 1985 survey of current BLM operations. There are 895 cases that were identified as being in backlog for case processing as of September, 1985. (See Table A.19.)

A.19 - 20 Reduce KGS Determination Cost

Algorithm

MINERALS

Alphanumeric

Present

895 KGS Determinations Pending
x 45.3 hours/KGS
x $18.50/hour = $ 750,055

Future

895 KGS
x 22.65 hours/KGS
x $18.50/hour = $ 375,027 (A.19)

NET SAVINGS - A/N $ 375,027

GRAPHICS

Present

895 KGS
x 135.88 hours/KGS
x $18.50/hour = $2,249,833

Future

895 KGS
x 67.94 hours/KGS
x $18.50/hour = $1,124,916

Net Savings - Graphics $1,124,917 (A.20)

SUMMARY

		Present System	Future System	Benefit
A.19 Minerals:	Alphanumeric	$ 750,055	$ 375,028	$ 375,028
A.20	Graphic	2,249,833	1,124,916	1,124,917
TOTAL MINERAL		$ 2,999,888	$ 1,499,944	$1,499,945

A.19 - 20 Reduce KGS Determination Cost

Table A.19 List of Identified KGS Backlog

OFFICE	TOTAL KGSs IN EFFECT	TOTAL BACKLOG	PRIORITY ONE	PRIORITY TWO	PRIORITY THREE
Bakersfield DO	129	26	2	24	
Billings SO	439	270	128	133	9
Reno SO	6	0	0		
*Albuquerque DO	27	52	52		
*Tulsa DO	1,093	50	50		
*Roswell DO	200	80	27	53	
*TOTAL NM SO	1,320	182	129	53	
Salt Lake City SO	86	1	0	1	0
*Casper DO	565	200	40	40	120
*Rawlins DO	106	12	0	9	3
*Rock Springs DO	90	49	4	18	27
*Worland DO	137	53	12	17	24
*TOTAL WY SO	898	314	56	84	174
TOTAL	3,246	895	334	303	258

Priority One - KGS action is necessary due to SIMO listing requirements.
Priority Two - KGS action is necessary due to new well completions.
Priority Three - Review of older KGSs, principally pre-November 1983 determinations.

A.21 - A.24 Reduce Records Maintenance Not in Another Function

Narrative

Records maintenance is the updating of Master Title Plats, Special Use and Supplemental Plats, Historical Indices and Serial Register Pages in the western State Offices and tract book records in the Eastern States Office. Case actions, accounting advices, notations, noting of docket control cards are also part of this function.

Personnel Functions:

- Hand drafting and typing of each change or addition.
- Making necessary paper copies and microfilm for distribution.
- Filing of copies in Bureau records, i.e., public room.

Present Manual System

This entire workload is now done manually.

Proposed Automated System

The automated system will essentially eliminate the traditional manual methods. Plat updates will be automated using the alphanumeric case land data and land description and coordinate data bases and processing. Alphanumeric data will be used to produce Historical Index equivalents. Distribution and copying will be eliminated through telecommunication and automated output products.

Benefits Summary

A records maintenance time component is included as an integral part of all appropriate algorithms, other case records activities are included here.

A.21 - A.24 Reduce Records Maintenance Not in Another Function

Algorithm:

LANDS

Alphanumeric

Present
3,960 changes (not in other algor.)
x 5 minutes/change
x $.31/minute = $ 6,140

Future
$0
Benefit, Lands A/N = $ 6,140 (A.21)

Graphics

Present
200 changes
x 30 minutes/change
x $.31/minute = $1,860

Future
$0
Benefit, Lands graphic $1,860 (A.22)

MINERALS

Alphanumeric

Present
12,530 changes (not in other algor.)
x 5 minutes/change
x $.31/minute = $ 19,420

Future
$0
Benefit, Minerals A/N = $19,420 (A.23

Graphics

Present
600 changes
x 30 minutes/change
x $.31/minute = $5,580

Future
$0
Benefit Min. Graphics $5,580 (A.

SUMMARY

		Present System	Future System	Benefit
A.21 Land:	Alphanumeric	$ 6,140	0	$ 6,140
A.22	Graphic	1,860	0	1,860
	TOTAL LAND	$ 8,000	0	$ 8,000
A.23 Mineral:	Alphanumeric	$19,420	0	$19,420
A.24	Graphic	5,580	0	5,580
	TOTAL MINERAL	$25,000	0	$25,000
	TOTAL	$33,000	0	$33,000

A.25 - A.32 Avoid Plat and Historical Index Restoration

Narrative

The physical deterioration of original plats, Title, Use and Supplemental is a major problem in the present manual records. Many of these plats have physically deteriorated to the point where areas are illegible and the original unusable as an updatable media capable of daily reproduction for use as a source document. Restoration is the redrafting or repair of existing records.

Personnel Functions:

- Plat restoration.
- Plat redrafting.

Present Manual System

The present system requires the manual restoration, often total redrafting of plats and Historical Indices to regain the utility and reproducibility of the records.

Proposed Automated System

Automation of these graphics will provide automated outputs having the same content and similar formats using both screen displays and paper plots. The existing paper plat records will be microfilmed for archival record access. Cyclical restoration of plats will be eliminated.

Benefits Summary

Savings are fully attributable to the avoidance of the plat restoration effort.

A.25 - A.32 (continued)

RECORD RESTORATION DATA

Workload	Number of Records Requiring Restoration by Method						
	Hand Draft/Type		Some Photocopy Activity		Total	Part of Total	
	Part	Number	Part	Number			
Alphanumeric - HI							
Historical Index	.10	22,200	.90	199,800	222,000		0.62
Graphics - Plats							
Master Title/Supplmtl.	.66	36,270	.34	18,684	54,954	.15	
Oil & Gas Use[1]	.67	26,000	1.00	26,000	52,000	.15	
Other Use[1]	.96	14,000	.04	14,000	28,000	.08	
Total Plats	.67	76,270	.33	58,684	134,954		0.38
Total Records		98,470		258,484	356,954		1.00

Equipment for Restoration - 8-year cost:
Purchase, Maintain and Operate
8 Photocopiers (e.g., Xerox 2080) x $110,000/copier $880,000

Maintain and Operate:
Four (4) Existing Photocopiers (Xerox 2080) x $ 17,750/copier 71,000
TOTAL $951,000

Photocopy = $\frac{\$951{,}000 \text{ 8-year cost}}{258{,}484 \text{ records}}$ = $3.68/record

Cost Allocation by Program: Lands, 25 percent; Minerals, 75 percent

Algorithm for Present System Non-Personnel Costs (and benefit since cost with ALMRS is $0)

SUMMARY

	Program Percent		Cost/Record		Cost Share/Per Work		Benefit
A.25 Land Alphanumeric	.25	x	$3.68	=	$ .92	x 199,800 HIs	= $183,816
A.26 Graphic	.25	x	3.68	=	.92	x 58,684 Plats	= 53,989
TOTAL LAND RECORDS					.92	x 258,484	= $237,805
A.27 Mnrl Alphanumeric	.75	x	$3.68	=	$2.76	x 199,800 HIs	= $551,448
A.28 Graphic	.75	x	3.68	=	2.76	x 58,684 Plats	= 161,968
TOTAL MINERAL RECORDS					2.76	x 258,484	= $713,416
TOTAL NON-PERSONNEL							$951,221

[1] All use plats, e.g., oil and gas and others that need restoration, start with a copy of the MTP. In effect, each township is handled twice—once for making the copy, and second, for drafting of all use data to it.

A.25 - A.32 Avoid Plat and Historical Index Restoration (Continued)

ERSONNEL COST FOR RESTORATION

	Work Unit		Work Time—Copy and Draft/Type[1]		Cost	Totals
Alphanumeric						
Historical Indexes	22,200 Typing	x	1 hour/HI	x	$18.50/hr =	$ 412,920
Historical Index	199,800 Copy	x	0.5 hour/HI	x	18.50/hr =	1,858,140
TOTAL ALPHANUMERIC	222,000 records	x	0.5530 hr/rec (33 min.)	x	18.50/hr =	$ 2,271,060
Plat Graphic						
Master Title Suppmtl	36,270 Draft	x	15 hr/plat	x	$18.50/hr =	$10,064,925
	18,684 Copy	x	0.5 hr/plat	x	18.50/hr =	173,761
Oil and Gas Use	26,000 Draft	x	6 hr/plat	x	18.50/hr =	2,886,000
	26,000 Copy	x	0.5 hr/plat	x	18.50/hr =	241,800
Other Use Plats	14,000 Draft	x	20 hr/plat	x	18.50/hr =	5,180,000
	14,000 Copy	x	0.5 hr/plat	x	18.50/hr =	130,200
TOTAL PLAT	134,954 Records	x	7.4807/hr/rec (446.4 min.)	x	18.50/hr =	$18,676,686
TOTAL PERSONNEL						$20,947,746
TOTAL NON-PERSONNEL						951,221
TOTAL RECORD RESTORATION						$21,898,967

[1] Photocopying restoration includes copy and some redraft, retype time.

gorithm for Present System Personnel Costs (and benefit since cost with ALMRS is $0)

SUMMARY

	Prog Part		Minutes/ Record		Prog Share of Minutes	Records		Benefit
A.29 Lands Alphammeric	.25	x	33.0	=	8.25	222,000 HIs	x 0.31/min =	$ 567,76
A.30 Graphic	.25	x	446.4	=	111.61	134,954 Plats	x 0.31/min =	4,669,17
TOTAL LANDS (& Avg)	.25	x	63.1	=	47.33	356,954 Rcrds	x 0.31/min =	$ 5,236,93
A.31 Mnrls Alphanumeric	.75	x	33.0	=	24.75	222,000 HIs	x 0.31/min =	$ 1,703,29
A.32 Graphic	.75	x	446.4	=	334.82	134,954 Plats	x 0.31/min =	14,007,51
TOTAL MINERAL (& Avg)	.75	x	189	=	141.98	356,954 Rcrds	x 0.31/min =	$15,710,81
TOTAL PERSONNEL								$20,947,74

A.33 - A.36 Non-Case Records Activities

Narrative

Non-case records activity refers to records functions that cannot be assigned to any one case file. Examples of this are: cadastral survey notes, plats and docket activity. These activities require that an update be made to the records. The new notations often require searching the past history for a comparison of what is fact and what changes to make.

Personnel Functions:

- Review new survey documents.
- Pull and file records to be updated.
- Verify changes to be made.
- Distribute copies of updated records.

Present Manual System

When new documents are received that require information to be changed, the records section will pull the township records to be updated. The old and new information is compared to determine the proper notation. The notation is made and new copies are distributed.

Proposed Automated System

When new documents are received, a comparison will be made on-line via a terminal with existing information. Changes will be made on-line resulting i an immediate update to the data base with the new information available to anyone who logs into the system.

This new procedure will eliminate the pulling, filing and copying of plats each time a change is to be made. The research time will be greatly reduced by having the information on-line.

A.33 - A.36 Non-Case Records Activities

Algorithm:

LANDS

ALPHANUMERICS

Present
12,375 Notations
x 20 minutes/notation
x $0.31/minute = $76,725

Future
12,375 notations
x 6 minutes/notation
x $0.31/minute = $23,017

NET SAVINGS - A/N = $53,708 (A.33)

GRAPHICS

Present
37,125 notations
x 20 minutes/notation
x $0.31/minute = $230,175

Future
37,125 notations
x 6 minutes/notation
x $0.31/minute = $69,052

NET SAVINGS-GRAPHICS = $161,123 (A.34)

MINERALS

ALPHANUMERICS

Present
15,125 notations
x 20 minute/notation
x $0.31/minute = $93,775

Future
15,125 notations
x 6 minutes/notation
x $0.31/minute = $28,132

NET SAVINGS - A/N = $65,643 (A.35)

GRAPHICS

Present
45,375 notations
x 20 minutes/notation
x $0.31/minute = $281,325

Future
45,375 notations
x 6 minutes/notations
x $0.31/minute = $ 84, 397

NET SAVINGS-GRAPHICS = $196,928 (A.36)

SUMMARY

	Present System	Future System	Benefit
A.33 Land: Alphanumeric	$ 76,725	$ 23,017	$ 53,708
A.34 Graphic	230,175	69,052	161,123
TOTAL LAND	$ 306,900	$ 92,069	$ 214,831
A.35 Mineral: Alphanumeric	$ 93,775	$ 28,132	$ 65,643
A.36 Graphic	281,325	84,397	196,928
TOTAL MINERAL	$ 375,100	$ 112,529	$ 262,571
TOTAL	$ 682,000	$ 204,598	$ 477,402

A.37 - A.38 Reduce Management Reporting Costs

Narrative

Preparation of Management Reports and Statistical Information for land and mineral casework activity is a labor intensive area and difficult to manage for timely and consistent data. The management problems associated with this area are largely due to the lack of credibility and usability of the statistical information and the laborious task of BLM records personnel trying to keep numerous manual records in an attempt to account for a high volume of case actions. This accountability is further complicated by the continual flow of case files from one area to another area for a variety of actions that must also be manually noted. The casework area is an ever increasing problem due to the large volume of cases being filed and processed and the emphasis on BLM managers for their accountability for money spent and work done (Units of Accomplishment, Progress Reporting).

The statistical information is used by BLM managers in their annual report to Congress (Public Land Statistics), other agencies, the general public, and numerous requests from the BLM Washington Office. BLM managers must also rely on these figures to project future budget requests (Annual Work Plan) and support policy and analysis. The information in both the Management Reports and Statistics is requested in a variety of formats and time periods.

Personnel Functions

- Continuous updating of manual records (approximately eight official records as outlined in BLM Manual Release 1274).
- Annual Work Plan preparation.
- Progress reporting (monthly, bimonthly, quarterly, annually).
- Responding to requests for information.
- Preparation of the Public Land Statistics.

Present Manual System

The present manual system lacks both credibility and usability with the general public and other agencies as well as with BLM managers. The reports and statistical information are in prestructured forms, making it difficult and time consuming to reformat or to break out different time periods as is frequently requested. It is difficult for BLM managers to determine accomplished workloads for "Progress Reporting" (also a time consuming process). It is difficult to project future workloads for budget requests and Annual Work Plan preparation. There is no standardization throughout the Bureau for compiling these figures, thereby creating confusion among BLM personnel and not giving the Bureau a true picture of the land and mineral casework management situation.

Proposed Automated System

An automated system will, for the first time, give accurate and nationally consistent land and mineral casework statistics. In order to develop and implement an automated system, standardization will have to be established.

A.37 - 38 (continued)

With standardization of the way the figures are compiled, credibility can be established. The requested information will be readily available in any format due to the ad hoc query and reporting features of the ALMRS system. The bimonthly progress reporting can be automatically calculated and transmitted to the appropriate office. This information will be available immediately in any BLM State, District, or Resource Area Office. The automated system will be designed to allow the user to locate required information with a minimum of BLM personnel assistance.

Computation figures for this benefit are detailed on the following page.

Benefits Summary

The amount of savings in BLM records personnel time will be due to the elimination of numerous progress records that are now manually maintained. BLM records personnel will no longer have to calculate manually the units of accomplishment, fill out the appropriate forms, and transmit to the Washington or the Service Center Offices for a consolidation of all States. This entire process will be calculated for each State Office and transmitted and consolidated automatically. There will be a significant savings of BLM records personnel time when it is no longer necessary to pull all case files and manually identify and count actions, calculate the totals, and verify them against their own progress records. An added capability will be offered to users that will allow them to pull a percentage of statistical information and management reports with no BLM personnel assistance. Time will also be saved for BLM managers due to the reduced time in preparing Annual Work Plans. Another area of significant timesaving for BLM records personnel is that they will no longer have to calculate manually all the statistics for the annual report to Congress (Public Land Statistics).

A.37 - A.38 Reduce Management Reporting Costs

Algorithm

LANDS

ALPHANUMERICS

Present:
13 BLM offices (11 SO, WO, SC)
x 10.3 workmonths/year
x $3,200/workmonth = $428,480

Future:
13 BLM offices
x 1.3 workmonths/year
x $3,200/workmonth = $ 54,080

NET SAVINGS - A/N = $374,400 (A.37)

MINERALS

ALPHANUMERICS

Present:
13 BLM offices
x 24.15 workmonths/year
x $3,200/workmonth = $1,004,640

Future:
13 BLM offices
x 16.15 workmonths/year
x $3,200/workmonth = $ 671,840

NET SAVINGS - A/N = $ 332,800 (A

SUMMARY

	Present System	Future System	Benefit
A.37 Lands Alphanumeric	$ 428,480	$ 54,080	$ 374,400
A.38 Minerals Alphanumeric	1,004,640	671,840	332,800
TOTAL ALPHANUMERIC	$1,433,120	$ 725,920	$ 707,200

A.39 - A.42 Reduce Query Time (Land, Mineral, and other Personnel)

Narrative

The Query Module describes responses by BLM personnel to inquiries regarding land and mineral activities from BLM (in-house), other federal agencies, and the public. This module includes all inquiries, except those asked by an applicant, lessee, etc., about their specific case, that are included in case processing.

The typical query may be related either to a land or mineral case or to the status records. For example, a mineral query can be composed of questions related to an oil and gas lease. A typical land query may be related to a right-of-way case It is anticipated that the inquiries will be divided 50% alphanumeric and 50% graphics in the ALMRS system.

Personnel Functions:

- Assist the public in the use of plats.
- Assist the public in the use of alphanumeric data.
- Use of ALMRS by non-land and mineral people in other programs.
- Use of plats by Cadastral Survey.

A.39 - A.42 (continued)

Present Manual System

Manually checking the records now often exceeds ten minutes and averages five minutes. In the present system, locating a case file alone often exceeds 20 minutes.

Proposed Automated System

ALMRS will make possible a reduction in time to process a query by having the data regarding status records, case location, and case information available at all bureau terminal locations. This availability will eliminate the necessity for BLM personnel to check records manually and to locate case files. A majority of the inquiries can be answered from data that will be entered into ALMRS.

For queries that require use of a case file to review or verify documents, signatures, seals, or certifiction, the computer will furnish the location of the file.

Benefits Summary

The savings due to an automated system because the present system does not have the needed information in one location. It is necessary for BLM personnel to visit numerous locations, and requires that records and documents be pulled and refiled. Also, the majority of this information is presently located in the State Offices, which requires a call or numerous calls to the State Office for the required information when the request is received in a District or Area Office. The automated system will be designed so that all the needed information will be available at any terminal.

A.39 - A.42 Reduce Query Time (Land, Mineral, and other Personnel)

Algorithm

33,000,000 queries x 40% (BLM portion) = 13,200,000

LANDS

Alphanumerics

Present:
2,211,000 queries (document searches)
x 5 minutes/query[1]
x $0.31/minute = $3,427,050

Future:
2,211,000 queries
x 3 minutes/query[2]
x $0.31/minute = $2,056,230

NET SAVINGS - A/N = $1,370,820 (A.39)

Graphics

Present:
1,089,000 queries (document searches)
x 5 minutes/query
x $0.31/minute = $1,687,950

Future:
1,089,000 queries
x 3 minutes/query
x $0.31/minute = $1,012,770

NET SAVINGS - A/N = $ 675,180 (A.40)

MINERALS

Alphanumerics

Present:
6,633,000 queries (document searches)
x 5 minutes/query
x $0.31/minute = $10,281,150

Future:
6,633,000 queries
x 3 minutes/query
x $0.31/minute = $6,168,690

NET SAVINGS A/N = $4,112,460 (A.4

Graphics

Present:
3,267,000 queries (document searches)
x 5 minutes/query
x $0.31/minute = $5,063,850

Future:
3,267,000 queries
x 3 minutes/query
x $0.31/minute = $3,038,310

NET SAVINGS A/N = $2,025,540 (A.4

SUMMARY

	Present System	Future System	Benefit
A.39 Land: Alphanumeric	$ 3,427,050	$ 2,056,230	$1,370,820
A.40 Graphic	1,687,950	1,012,770	675,180
TOTAL LAND	$ 5,115,000	$ 3,069,000	$2,046,000
A.41 Mineral: Alphanumeric	$10,281,150	$ 6,168,690	$4,112,460
A.42 Graphic	5,063,850	3,038,310	2,025,540
TOTAL MINERAL	$15,345,000	$ 9,207,000	$6,138,000
TOTAL	$20,460,000	$12,276,000	$8,184,000

[1] Average of manual alphanumeric and graphic searches.

[2] In automated system, 5 minutes A/N and 15 minutes graphics. Average = 10 minutes, three screens per session; hence query equivalent = 10/3 = 3 minutes.

A.43 - A.46 Assist Users

Narrative

It is the Bureau's responsibility to establish and maintain the Public Land records. Therefore, the Bureau has a large workload in assisting the public in their use. These records are used by members of the general public, other agencies, and BLM personnel. For the most part, these requests for assistance are now handled in the BLM State Office Public Rooms. These requests involve information regarding land status (availability for a specified purpose) and case-related questions, and are from land and mineral interests. Records information is accessed in both printed form and from Master Title Plats, use plats, and supporting documents.

Assistance to the users for either a lands or minerals case primarily involves BLM Records personnel. Queries in District and Area Offices involve lands, minerals, resources, and adjudication personnel. In addition to public assistance, the lands and minerals personnel assist other Bureau personnel in other programs requiring records information.

Personnel Functions

- Clarify user needs.
- Determine how best to assist the user, i.e., alphanumerics or graphic format.
- Process the request.
- Deliver a response to the user.

Present Manual System

With the present manual system, the user must go to numerous locations to gather information relating to a specific inquiry, e.g., survey information, case files information, or general ownership and status. The manual records that are used must be pulled and refiled by BLM personnel for each request that requires this information. When these requests are received in the District or Area Offices, it is often necessary for BLM personnel to call the BLM State Offices for information that is available only there. It is sometimes necessary to make several calls per request, and the information may not be available until the next day or later.

Proposed Automated System

With an automated system, all the necessary information to respond to an inquiry will be immediately available via a terminal in all State, District, and Area Offices. The system will be designed to allow the users to find required information themselves.

A.43 - A.46 (continued)

Benefits Summary

The amount of savings in BLM personnel time will be due to having all current information available in all BLM offices instead of having to gather the information from numerous locations. There will also be a savings in time because the documents will no longer be manually pulled and refiled every time a request is answered. BLM personnel time will also be saved because with the automated system the user will be able to obtain needed information without BLM personnel assistance.

A.43 - A.46 Assist Users

Algorithm

LANDS

Alphanumerics

Present:
48,000 requests
x 40 minutes/requests
x $0.31/minute = $595,200

Future:
48,000 requests x 30%
x 20 minutes/requests
x $0.31/minute = $ 89,280

NET SAVINGS - A/N = $505,920 (A.43)

GRAPHICS

Present:
48,000 requests
x 55 minutes/requests
x $0.31/minute = $818,400

Future:
48,000 requests x 30%
x 20 minutes/requests
x $0.31/minute = $ 89,280

NET SAVINGS-GRAPHICS = $729,120 (A.44)

MINERALS

Alphanumerics

Present:
146,000 requests
x 15 minutes/requests
x $0.31/minute = $678,900

Future:
146,000 requests x 30%
x 5 minutes/requests
x $0.31/minute = $ 67,890

NET SAVINGS - A/N = $611,010 (A.45)

GRAPHICS

Present:
146,000 requests
x 15 minutes/requests
x $0.31/minute = $678,900

Future:
146,000 requests x 30%
x 5 minutes/requests
x $0.31/minute = $ 67,890

NET SAVINGS - GRAPHICS = $611,010 (A.46)

SUMMARY

		Present System	Future System	Benefit
A.43 Land:	Alphanumeric	$ 595,200	$ 89,280	$ 505,920
A.44	Graphic	818,400	89,280	729,120
TOTAL LAND		$1,413,600	$ 178,560	$1,235,040
A.45 Mineral:	Alphanumeric	$ 678,900	$ 67,890	$ 611,010
A.46	Graphic	678,900	67,890	611,010
TOTAL MINERAL		$1,357,800	$ 135,780	$1,222,020
TOTAL		$2,771,400	$ 314,430	$2,457,060

A.47 - A.50 Replaced ADP Costs: Case Recordation, Mining Claims

Narrative

The present ADP system costs are approximately 22 million dollars per year, excluding telecommunications costs. A significant portion, approximately $6.8 million, of this cost is directly attributable to the support of Case Recordation, ORCA, and Mining Claims systems. Costs for these systems will be eliminated when they are incorporated in the ALMRS system. These cost reductions include both personnel and non-personnel costs.

Personnel Functions:

- Equipment operators.
- Software development.
- Software maintenance.
- User support.

Present System

The present approach includes partially automated, unintegrated systems for ORCA, case recordation and mining claim recordation. These systems are implemented on the DPS8 located at the Service Center or State Office Level-6 minicomputers. .

Table A.47 portrays FY 85 recurring ADP system costs attributable to ALMRS. Data for this table was derived from several sources: the OMB A-11 (Information Systems) Report for FY 85 and the Bureau's Financial Management System Report. A poll of the States indicates that, on average, 50% of ADP system usage is attributable to ALMRS-related activities.. For the Service Center, the ALMRS related usage is 30%.

Column 2 shows the amount of money spent on equipment for ALMRS related use in FY 84. This amount was derived by adding lease costs with purchase costs divided by 5 to provide recurring costs equivalents using a 5-year life cycle. Column 3 reflects costs for ALMRS related hardware maintenance and software maintenance and licenses. Column 4 indicates the amount of money spent in FY 85 for data communications attributable to ALMRS. Column 5 portrays space costs attributable to ALMRS based on the number of employees (Column 8) times 135 square feet times $15/square feet. Column 6 indicates the miscellaneous costs attributable to ALMRS. These costs include such items as supplies, travel, contractor support, and studies. Column 7 shows the non-personnel costs total. Columns 8 and 9 reflect ALMRS personnel costs. Column 8 indicates the number of information system people involved with ALMRS and Column 9 shows the cost of these personnel. Costs were derived by multiplying the number of personnel by $32,000, which represents the average, fully loaded costs for a workyear. Column 10 lists the total ADP systems cost attributable to ALMRS.

Proposed Automated System

The proposed system will replace these disparate systems with a fully integrated, distributed system available to all State, District and Area Offices.

Benefit Summary

Replaced systems will reduce land and mineral costs by $6,754,000.

A.47 – A.50 (continued)

TABLE A.47 FY 1985 ADP SYSTEM COSTS ATTRIBUTABLE TO ALMRS SYSTEM IN 1985 DOLLARS

OFFICE 1	EQUIPMENT PURCHASE AND LEASE 2	MAINT. HARDWARE AND SOFTWARE 3	DATA LINE COSTS 4	SPACE COST 5	RECURRING MISC. COST 6	TOTAL NON-PERSONNEL 7	NUMBER OF PERSONNEL 8	PERSONNEL COST 9	TOTAL COST 10
STATES									
AZ	57	62	15	16	41	191	8	256	447
CA	8	22	20	14	13	77	7	224	301
CO	11	64	20	24	31	150	12	384	534
ESO	2	10	14	4	10	40	2	64	104
ID	7	33	13	4	2	59	2	64	123
MT	17	19	20	10	2	68	5	160	228
NM	37	49	20	24	10	140	12	384	524
NV	17	27	17	10	16	87	5	160	247
OR	141	55	17	20	53	286	10	310	606
UT	39	22	22	12	13	100	6	192	292
WY	62	50	22	8	82	224	4	128	352
ST.TOTAL	390	413	200	146	273	1,422	73	2,336	3,758
WASH.	3	18	36	4	20	81	2	64	[illegible]5
DSC	180	298	350	97	390	1,315	48	1,536	[illegible],851
HQ/SC TL.	183	316	386	101	410	1,396	50	1,600	2,996
FY 85 TL.	573	729	586	247	683	2,818	123	3,936	6,734

A.47 - A.50 Replaced ADP Costs: Case Recordation, Mining Claims

Algorithm:

From Table A.47:

Cost Element	Total Savings
Equipment	$ 573,000
Maintenance	729,000
Data Communication	586,000
Space	247,000
Misc. (Supplies, Travel, Contractor Studies)	683,000
Total Non-Personnel	$2,818,000
Personnel	$3,936,000
Total Present System	$6,754,000
Future System	0

Allocation to program is as follows:
SUMMARY

	Program Part	Present Cost	Present System Program Share	Future System	Benef
A.47 Non-Personnel Land	.2	$2,818,000	$ 563,600	0	$ 563,6
A.48 Mineral	.8	2,818,000	2,254,000	0	2,254,0
TOTAL NON-PERSONNEL			$2,818,000		2,818,0
A.49 Personnel Land	.2	$3,936,000	$ 787,200	0	$ 787,2
A.50 Mineral	.8	3,936,000	3,148,800	0	3,148,8
TOTAL PERSONNEL			$3,936,000		$3,936,0
TOTAL					$6,754,0

A.51 - A.54 Facilities Not Needed (ADP Excluded)

Narrative

With increased productivity of people and changes in work methods, some equipment, space, and supplies, etc., will be replaced by ALMRS equipment, space, etc. Facility costs no longer needed are shown here; new ALMRS facilities, etc., are shown in the ALMRS cost section.

Benefits Summary

Using present system cost data for facilities (FY 1984 adjusted to a FY 1985 base), an estimate for savings is made by seven workstation cost centers and five non-personnel cost types. Present cost, portion saved, and amount saved are estimated in each of the 30 cells. The portion saved of each cost is estimated based upon the anticipated impact in changed workload and method.

Table A.51 shows: base year (FY 1985) cost in the "a" part Columns 2-6, portion saved in the "b" part, and amount saved in the "c" part. Summaries by station are shown in Column 7 and by cost type in the last three rows. The basic cost data is from Table 1 in Section IV, Present System Cost.

The 42 percent cost reduction in facility requirements corresponds to the 41 percent reduction in personnel cost requirements developed in Table VI-5 (i.e., Column 37 Automated System Cost is 59 percent of present labor cost rates).

A.51 – A.54 Facilities Not Needed (ADP Excluded)

TABLE A.51A – Estimate of Present System Non-Personnel Saving at Base Year 1985 Rate

Facilities and Other Non-Personnel Costs, Reduction Portion, and Amount Saved ($1,000s)

Cost Center: Land and Mineral Stations	Equipment			Equip Maint			Communicatn			Space			Supplies/Other			TOTAL				Split by Date Type			
	B (B.01-10)			D.40 (D.41-47)			C.01,03,04			D.20 (D.21-30)			D.70-71			Cost	Weighted Reduct.	Savings	Remain Cost	Save AN	Save GR	Remain AN	Remain GR
(1)	2a	2b	2c	3a	3b	3c	4a	4b	4c	5a	5b	5c	6a	6b	6c	7a	7b	7c	7d	8a	8b	9a	9b
1. Plat Draft and HI typing	136	x.97	131.9	35	x.97	34.0	—	—	—	270	x.97	261.9	39	x.97	37.8	480	x.97	465.6	14.4	0	466	0	14
2. Rcv Apln and Data Validation	40	x1.00	40.0	40	x1.00	40.0	371	x1.00	371.0	122	x1.00	122.0	5	x1.00	5.0	578	x1.00	578.0	0.0	500	78	0	0
3. Dockets (Case Files	21	x.50	10.5	—	—	—	49	x.90	44.1	180	x.5	90.0	15	x.90	13.5	265	x.60	158.1	106.9	158	0	107	0
4. Public Room and Assistance	28	x.75	21.0	26	x.75	19.5	371	x.45	167.0	417	x.75	312.8	20	x.90	18.0	862	x.62	538.3	323.7	288	250	174	150
5. Adjudica'n and Process Cases	23	x.25	5.8	19	x.25	4.8	693	x.45	311.8	436	x.25	109.0	10	x.90	9.0	1181	x.37	440.4	740.6	140	300	341	400
6. Mining Claim Recordation	52	x1.00	52.0	58	x1.00	58.0	49	x1.00	49.0	209	x1.00	209.0	25	x1.00	25.0	393	x1.00	393.0	0	393	0	0	0
7. L & M Case Processing	204	x.20	40.8	231	x.20	46.2	2189	x.35	766.2	3297	x.20	659.4	10	x.40	4.0	5931	x.26	1516.6	4414.4	817	700	2314	2100
TOTAL COST	504			409			3722			4931			124			9690							
WEIGHTED REDUC		x.60			x.50			x.46			x.36			x.90			x.4221			.56	.44	.52	.48
TOTAL SAVING			302.0			202.5			1709.1			1764.1			112.3			4090.0		2296	1794		
REMAINING COST			202			206.5			2012.9			3166.9			11.7				5600			2936	2664

The allocation of non-personnel cost reductions by data type is estimated in

A.51 - A.54 Facilities Not Needed (AIP Excluded)

Cost impacts in the base year of a fully implemented ALMRS are summarized in Table A.51B. Costs are allocated to the programs as follows: lands, 25 percent; minerals, 75 percent. Data in Table A.51A are used to determine facility costs by data type.

Algorithm	Data Type	Present System Cost/Year 1/			Program	Program Percent	Benefit by Program and Data Type
		Total	Remaining Present & ALMRS	Saved Costs			
A.51	Alphanumeric	5,232,000	2,936,000	2,296,000	Land	.25	574,000
A.53					Mineral	.75	1,722,000
Total	Alphanumeric					1.00	2,296,000
A.52	Graphic	4,458,800	2,664,00	1,794,000	Land	.25	448,500
A.54					Mineral	.75	1,345,500
Total	Graphic					1.00	1,794,000
Total		9,690,000	5,600,000	4,090,000			4,090,000

1/ TABLE A.51B - Alphanumeric Columns 8a, 9a; Graphic 8b, 9b, Total Col. 7a

Summary		Present	Future	Benefit
A.51 Land:	Alphanumeric	1,308,000	734,000	574,000
A.52	Graphic	1,114,500	666,000	448,500
Total Land		2,422,500	1,400,000	1,022,500
A.53 Mineral:	Alphanumeric	3,924,000	2,202,000	1,722,000
A.54	Graphic	3,343,500	1,998,000	1,345,500
Total Mineral		7,267,500	4,200,000	3,067,500
TOTAL		9,690,000	5,600,000	4,090,000

A.55 - A.60 Cost Recovery, Product Sales

Narrative

The general user community of the present land records system (master title, special use plats, historical indexes, serial register pages and maps) have historically purchased copies for various reasons. The Bureau has established a copy fee account to handle this miscellaneous money from the sale of alphanumeric and graphic products. At present, the Bureau's copy fee account shows annual revenue of approximately 2.0 to 2.5 million dollars.

Personnel Functions:

- Pull requested information.
- Copy alphanumeric reports for users.
- Copy graph products (master title, special use plats, and maps.
- Refile originals.
- Mail copies.

Present Manual System

With the present system, BLM personnel must retrieve information from numerous locations to produce copies or blue line prints of plats and maps for the general user community. BLM personnel receive daily requests for copies from walk-ins, phone requests, and mail requests. Upon receiving a request BLM public room personnel manually pull cadastral survey plats, master title plats, special use plats, serial register pages, and/or case files and send the materials in for reproduction. After the materials have been reproduced, public room personnel refile originals and send out all copies to the requester.

Proposed Automated System

With an automated system, all current land and mineral records and case file information will be available immediately at any terminal site in any BLM State, District or Resource Area Office. Requests from the user community will be answered at each office instead of forwarding all requests to the State Office. Users of the ALMRS system will be able to query and produce their own alphanumeric or graphic products at a terminal or through hard copy media.

Under the automated system, BLM expects an increased market for alphanumeric and graphic products. It is expected that the BLM will increase the copy fee account through the sales by approximately 6.1 million dollars.

Benefits Summary

BLM will benefit from the additional sales of products, and also in an increase in efficiency. BLM personnel will no longer be required to retrieve paper copies of plats or alphanumeric reports, or have to refile material in the automated system.

A.55 - A.60 Cost Recovery, Product Sales

Algorithm

LANDS

Alphanumeric

Products
1 million pages/year
x $ 0.25 copy fee/page = $250,000 (A.55)

Research
5000 searchs/year
x 15 min/search
x $0.31/min = $ 23,250 (A.56)
TOTAL ALPHANUMERIC $273,250

Graphic
500,000 maps/year
x $2.50/map = $1,250,000 (A.57)
TOTAL $1,523,250

MINERALS

Alphanumeric

Products
3 million pages/year
x $0.25 copy fee page = $750,000 (A.58)

Research
15,000 searchs/year
x 15 min/search
x $0.31/min = $ 69,750 (A.59)
TOTAL ALPHANUMERIC $819,750

Graphic
1.5 million maps/year
x $2.50/map = $3,750,000 (A.60)
TOTAL $4,569,750

TOTAL LANDS AND MINERALS $6,093,000

SUMMARY

			Present System	Future System	Benefit (only increase estimated)
A.55	Lands	Alphanumeric Products			$ 250,000
A.56		Alphanumeric Research			23,250
A.57		Graphic			1,250,000
		TOTAL LANDS			$1,523,250
A.58	Minerals	Alphanumeric Products			$ 750,000
A.59		Alphanumeric Research			69,750
A.60		Graphic			3,750,000
		TOTAL MINERALS			$4,569,750
		TOTAL			$6,093,000

A.61 - A.64 Initial Transfer of ALMRS Data to BLM's Geographic Information System

Narrative

Cost avoidance relates to the redundant gathering of spatially related coordinate data and the integration of Legal Land Description and status into graphic products. The Bureau is presently using a Geographic Information System (GIS) to analyze resource data on spatial projects. When ALMRS is operational, it is anticipated that spatially oriented land and mineral ownership, status, and use authorization information will be transmitted to GIS as base data over which resource information will be overlayed.

Personnel Functions

Bureau personnel will produce magnetic media copies of topologically structured ALMRS data.

Present Manual System

Projects within the BLM, using Geographic Information System technology manually digitize many data themes which will be in ALMRS data bases, e.g., land net, ownership, use, and mineral leases.

Proposed Automated System

With an automated system, ALMRS data (legal land description, status) and the geographic coordinates from the Cadastral Survey Geographic Coordinates will be topologically structured for use in the BLM's GIS. Geographic Information Systems will become another user of the ALMRS data bases as GIS projects require these data. ALMRS topologically structured information will be transmitted to GIS via magnetic media or telecommunication.

At present, BLM manages approximately 15,000 townships in the lower 48 states. ALMRS has estimated that the data collection costs for legal land description, status, and geographic coordinates at 955 dollars per township. ALMRS has estimated that approximately 50% of the total number of townships will be used in the Bureau's GIS. This estimate is equivalent to 7.2 million dollars of cost avoidance to the Bureau for data collection and topologically structuring the data.

Benefits Summary

BLM will benefit from non-duplication of spatial data acquisition, ease of transferring data from one system to another, standardization of data, and ease of updating data bases.

A.61 - A.64 Initial Transfer of ALMRS Data to BLM's Geographic Information System

Cost and Benefit Data for Data Sharing

Cost		Townships	Cost/Township	Percentage
Coordinate Data	$19,000,000	45,862	$414.29	42.3
Alphanumeric Data[1]	25,900,000	45,862	564.74	57.7
TOTAL	$44,900,000		$979.02	100.0

Program Allocation Based on Workload: Lands - 25 percent
Minerals - 75 percent

Computation of Program/Data Type Percentage

Program Data Type	Program Percent	Data Type Percent	Percent of Pgm/Data Combination	Cost and Benefit per Township	Per Township Benefit by Program and Data Type
Land Alphanumeric	.25	.58	.1450	$979	$141.95
Land Graphic	.25	.42	.1050	979	102.80
TOTAL LAND		100	.2500		$244.75
Mineral Alphanumeric	.75	.58	.4350	$979	$425.87
Mineral Graphic	.75	.42	.3150	979	308.38
TOTAL MINERAL		100	.7500		$734.25
TOTAL	100	100	100		$979.00
			TOTAL ALPHANUMERIC		$567.82
			TOTAL GRAPHIC		411.18

Number of Townships covered by the BLM Surface Management and where automated Geographic Information System data are anticipated is 7500 Townships.

Algorithms	Program and Data Type	Number of Townships	Benefit/Twp by Origin Pgm/Data	Benefit One Time
A.61	Land: Alphanumeric	7,500	$141.95/Township	$1,064,625
A.62	Graphic	7,500	102.80/Township	771,000
	TOTAL LAND		$244.75	$1,835,625
A.63	Mineral: Alphanumeric	7,500	$425.87/Township	$3,194,025
A.64	Graphic	7,500	308.38/Township	2,312,850
	TOTAL MINERAL		$734.25	$5,506,875
	TOTAL	7,500	$979.00	$7,342,500

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[1] Examples: Status, Land Description, Regulations, Sipulations, Master Names

A.65 - A.68 Update Subscription for ALMRS Data to the Bureau's Geographic Information System

Narrative

ALMRS will provide update subscriptions to users of the Bureau's Geographic Information System (GIS). The most current status will be provided through an updating service to GIS, so that Bureau managers will be making decisions with current information.

Personnel Functions:

Bureau personnel will produce magnetic media copies of topologically structured ALMRS data.

Present Manual System

At present, there is no such service in the Bureau.

Proposed Automated System

With an automated system, ALMRS data (legal land description, status) and the geographic coordinates from the Cadastral Survey (topologically structured) will be available through an updating service to users of the Bureau's GIS.

It is anticipated that users of GIS will be using the ALMRS updating service, thus a cost avoidance of approximately 1.8 million dollars will be saved annually.

Benefits Summary

BLM will benefit from non-duplication of acquisition of spatial data, ease of transfering data from one system to another, standardization of data, and easy update of data bases.

A.65 - A.68 Update Subscription for ALMRS Data to the Bureau's Geographic Information System

The annual benefit to the Bureau for annual update data transfer to the Bureau's Geographic Information System will be 25 percent of the initial costs of the data a cover 7,500 townships per year.

Algorithm

Data	Benefit Per Township Initial Data Transfer	Annual Benefit Percent of Initial	Annual Benefit	Number of Townships	Benefi Per Yea
A.65 Land Alphanumeric	$141.95	.25	$ 35.49	7,500	$ 266,1
A.66 Land Graphic	102.80	.25	25.70	7,500	192,7
TOTAL LAND	$244.75		$ 61.19		$ 458,9
A.67 Mineral Alphanumeric	$425.87	.25	$106.47	7,500	$ 798,5
A.68 Mineral Graphic	308.38	.25	77.09	7,500	578,1
TOTAL MINERAL	$734.25		$183.56		$1,376,7
TOTAL	$979.00		$244.75		$1,835,6

B. Other Federal Agency Benefits

B.1 - B.2 Reduced Management Reporting Cost

Narrative

This section includes BLM costs and savings in preparing Management Reports and Statistics as standardized output for other Federal agencies. The description of the equivalent function for BLM is valid because the internal working of the system will handle those reports in a similar manner. The same personnel who prepare internal reports will produce these external reports, and in a similar manner. These types of reports will be prepared following standard formats and will be supported by the business graphics capabilities of the system.

Benefit Summary

The total savings for Management Reports and statistics for other federal agencies are derived at 10% of the total savings for BLM, which is $706,800.

This saving is derived from the increased capabilities and faster processing under the automated system after full implementation.

The distribution between lands and minerals areas was then set in the same proportions as those in the BLM. These savings are entirely in alphanumeric operations.

B.1 - B.2 Reduced Management Reporting Cost

Algorithms

Total Savings
0.10 x $706,800 saved by BLM = $70,680

Lands Alphanumeric
0.53 x $70,680 = $37,400 (B.1)
Minerals Alphanumeric
0.47 x $70,680 = $33,280 (B.2)

SUMMARY

	Present System	Future System	Benefit
B.1 Land: Alphanumeric			$ 37,400
B.2 Mineral: Alphanumeric	Only Difference Estimated		33,280
TOTAL ALPHANUMERIC			$ 70,680

B.3 - B.6 Reduce Query Time

Narrative

The reduced query time for other Federal users is a reflection of the importance of lease and status records for all system users. As caretaker for these records, the BLM is responsible to the common needs of other surface management agencies. Allowance must be made in designing the system for the increased use of the lease and status records by other agencies. The general comments concerning the system parameters listed under BLM Query Module are cogent in this description. The internal workings of the system will handle queries from different sources in a similar manner.

System Description

It has been estimated that other federal surface management agencies will require support from the ALMRS system to handle portions of management reports and statistics and query related to their area of interest. The estimated saving of 4.12 million dollars is a salary reduction that the other surface management agencies will not require due to efficiencies resulting from automating the Bureau records. This estimate is based on a portion of the present Bureau system that was surveyed in 1984.

Benefits Summary

In the Query Module for Lands with alphanumeric queries, there is a saving of two (2) minutes per query for 1.65 million queries at $0.31 per minute, or 1.03 million dollars. Similarly, efficiencies in handling lands graphics queries result in saving 1.03 million dollars, and Minerals graphics queries save 1.03 million dollars. The total for other federal agencies for salaries is 4.12 million dollars.

B.3 - B.6 Reduce Query Time

33,000,000 queries x 20% (other Federal) = 6,600,000

Algorithm

LANDS

ALPHANUMERICS

Present:
1,650,000 queries
x 5 minutes/query[1]
x $0.31/minute = $2,557,500

Future:
1,650,000 queries
x 3 minutes/query[2]
x $0.31/minute = 1,534,5000

NET SAVINGS - A/N = $1,023,0000 (B.3)

GRAPHICS

Present:
544,500 queries
x 5 minutes/query
x $0.31/minute = $843,975

Future:
544,500 queries
x 3 minutes/query
x $0.31/minute = $506,385

NET SAVINGS - A/N = $337,590 (B.4)

MINERALS

ALPHANUMERICS

Present:
3,316,500 queries
x 5 minutes/query
x $0.31/minute = $5,140,575

Future:
3,316,500 queries
x 3 minutes/query
x $0.31/minute = $3,084,345

NET SAVINGS - A/N = $2,056,230 (B.5)

GRAPHICS

Present:
1,633,500 queries
x 5 minutes/query
x $0.31/minute = $2,531,925

Future:
1,633,500 queries
x 3 minutes/query
x $0.31/minute = $1,519,155

NET SAVINGS - A/N = $1,012,770 (B.6)

SUMMARY

		Present System	Future System	Benefit
B.3	Land: Alphanumeric	$ 2,557,500	$1,534,500	$1,023,000
B.4	Graphic	843,975	506,385	337,590
	TOTAL LAND	$ 3,401,475	$2,040,885	$1,360,590
B.5	Mineral: Alphanumeric	$ 5,140,575	$3,084,345	$2,056,230
B.6	Graphic	2,531,925	1,519,155	$1,012,770
	TOTAL MINERAL	$ 7,672,500	$4,603,500	$3,069,200
	TOTAL	$11,073,975	$6,644,385	$4,429,590

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[1] Average of manual alphanumeric and graphic searches.

[2] In automated system, 5 minutes A/N and 15 minutes graphics. Average = 10 minutes, three screens per session; hence query equivalent = 10/3 = 3 minutes.

B.7 - B.10 Initial Transfer of ALMRS Data in other Federal Information Systems

Narrative

Cost avoidance relates to gathering the spatially related coordinate data and the integration of Legal Land Description and Status into map products. Other Federal agencies are presently using a Geographic Information System (GIS) to analyze resource data on special projects. When ALMRS is operational, it is anticipated that spatially oriented land, mineral, ownership and use information will be transmitted to other Federal agencies for use in their GIS to be overlayed with resource data.

Personnel Functions:

Bureau personnel will produce magnetic media copies of topologically structured ALMRS data.

Present Manual System

Projects within other federal agencies using Geographic Information system technology manually digitize many data themes which will be available in ALMRS data bases, e.g., land net, ownership, use authorizations, and mineral leases.

Proposed Automated System

With an automated system, ALMRS data (legal land description, status) and the geographic coordinates from the Cadastral Survey Geographic Coordinates will be topologically structured for use in other federal agencies GISs. ALMRS topologically structured information will be transmitted to GIS via magnetic media or telecommunications.

At present, other federal agencies manage surface resources on approximately 17,200 townships in the lower 48 states. The data collection costs for legal land description, status, and geographic coordinates will be avoided by other agencies when using the ALMRS data bases. ALMRS estimated a cost avoidance to the federal government of approximately 24.6 million dollars for data collection and topological structuring of the data.

Benefits Summary

The federal government will benefit from non-duplication of acquisitioning of spatial data, ease of transfering data from one system to another, standardization of data, and easy update of data bases.

B.7 - B.10 Initial Transfer of ALMRS Data to other Federal Information Systems

Cost and Benefit Data for Data Sharing

Cost		Township	Cost/Township	Percentage
Coordinate Data	$19,000,000	45,862	$414.29	42.3
Alphanumeric Data[1/]	$25,900,000	45,862	$564.74	57.7
Total	$44,900,000		$979.02	100.0

Program allocation based on workload: Lands 25 percent
Minerals 75 percent

Program Data Type	Program Percent	Data Type Percent	Percent of Pay/Data Combination	Cost and Benefit Per Township of Data	Per Township Benefit By Program and Data Type
Land Alphanumeric	.25	.58	.1450	$979	141.95
Land Graphic	.25	.42	.1050	$979	102.80
Total Land		100	.2500		244.75
Mineral Alphanumeric	.75	.58	.4350	$979	425.87
Mineral Graphic	.75	.42	.3150	$979	308.38
Total Mineral		100	.7500		734.25
Total	100	100	100		979.00
Total Alphanumeric					567.82
Total Graphic					411.18

Number of townships covered by other major federal surface management agencies where automated records are anticipated: 17,200 townships.

Algorithms Program Data Type	No. Townships	Benefit/Twp by Origin Pgrm/Data	Benefit One-time
B.7 Land Alphnumeric	17,200	$141.95/Township	$ 2,441,540
B.8 Land Graphic	17,200	$102.80/Township	$ 1,768,160
B.9 Mineral Alphanumeric	17,200	$425.87/Township	$ 7,324,964
B.10 Mineral Graphic	17,200	$308.38/Township	$ 5,304,136
TOTAL	17,200	$979.00	$16,838,800

[1/] Examples: Status, Land Description, Regulations, Stipulations, Master Names.

B.11 - B.14 Update Subscription for ALMRS Data

Narrative

ALMRS will provide data updates to those federal agencies that have subscribed to the service and have acquired the initial data from BLM. The updating service will allow land managers in other agencies to make decisions using the most current land status information.

Personnel Functions:

- Bureau personnel will produce magnetic media copies of updates of ALMRS spatial and alphanumeric data.

Present Manual System

At present, no such service is provided by the Bureau.

Proposed Automated System

With an automated system, ALMRS data (legal land description, status) and the geographic coordinates from the Cadastral Survey Geographic Coordinates (topologically structured) and alphanumeric data will be available through an updating service to other federal agencies.

It is anticipated that users in other federal agencies will update approximately 50% of data initially received from ALMRS.

Benefits Summary

The federal government will benefit from nonduplication of acquiring spatial and alphanumeric data and have easy transfers of data from one system to another and standardization of data.

B.11 - B.14 Update Subscription for ALMRS Data

B.11 Update subscription for ALMRS data to the other federal systems.

The annual benefit to the Bureau for annual update data transfer to the other federal system will be for 100 percent of the initial costs and townships of the data and cover 8,600 townships per year (.5 X 17,200 twps).

Algorithm

Data	Benefit Per Twps. Initial	Annual Benefit Percent of	Annual Benefit	Number of Townships	Benefit Per Year
B.11 Land Alphanumeric	$141.95	100	$141.95	8,600	$1,220,77
B.12 Land Graphic	$102.80	100	$102.80	8,600	$ 884,08
Total Lands	$244.75		$244.75		$2,104,85
B.13 Mineral Alphanumeric	$425.87	100	$425.87	8,600	$3,662,48
B.14 Mineral Graphic	$308.38	100	$308.38	8,600	$2,652,06
Total Mineral	$734.24		$734.25		$6,314,55
Total	$979.00		$979.00		$8,419,40

C.1 - C.4 Reduce Query Time

Narrative

The system users included in this section are state and local governments, private companies, and all others who require access to the records in the card of BLM. The general comments concerning the system design which were discussed under the BLM Query Module are still valid because the internal working under the automated system will be the same. An underlying assumption is that those users will have questions similar to the queries proposed by BLM and other federal agencies.

System Description

The saving is based on more efficient queries and faster queries in the automated system. There are an estimated 8.8 million queries per year for alpha and 4.4 million graphic queries in the present system that are answered at an average of five (5) minutes per query.

Benefits Summary

The future automated system provides the requested information at an estimated two (2) minutes per query faster for a net non-federal savings of 8.2 million dollars.

C.1 - C.4 Reduce Query Time

Algorithm:

33,000,0o00 queries x 40% (other) = 13,200,000

LANDS

ALPHANUMERICS

Present
2,211,000 queries
x 5 minutes/query[1]
x $0.31/minute = $3,427,050

Future
2,211,000 queries
x 3 minutes/query[2]
x $0.31/minute = $2,056,230

Benefit = $1,370,820 (C.1)

GRAPHICS

Present
1,089,000 queries
x 5 minutes/query
x $0.31/minute = $1,687,950

Future
1,089,000 queries
x 3 minutes/query
x $0.31/minute = $1,012,770

Benefit = $ 675,180 (C.2)

MINERALS

ALPHANUMERICS

Present
6,633,000 queries
x 5 minutes/query
x $0.31/minute = $10,281,150

Future
6,633,000 queries
x 3 minutes/query
x $0.31/minute = $ 6,168,690

Benefit = $ 4,112,460 (C.3)

GRAPHICS

Present
3,267,000 queries
x 5 minutes/query
x $0.31/minute = $ 5,063,850

Future
3,267,000 queries
x 3 minutes/query
x $0.31/minute = $3,038,310

Benefit = $2,025,540 (C.4)

SUMMARY

		Present System	Future System	Benefit
C.1 Land:	Alphanumeric	$ 3,427,050	$ 2,056,230	$1,370,820
C.2	Graphic	1,687,950	1,012,770	675,180
TOTAL LAND		$ 5,115,000	$ 3,069,000	$2,046,000
C.3 Mineral:	Alphanumeric	$10,281,150	$ 6,168,690	$4,112,460
C.4	Graphic	5,063,850	3,038,310	2,025,540
TOTAL MINERAL		$15,345,000	$ 9,207,000	$6,138,000
TOTAL		$20,460,000	$12,276,000	$8,184,000

[1] Average of manual alphanumeric and graphic searches.

[2] In automated system, 5 minutes A/N and 15 minutes graphics. Average = 10 minutes, three screens per session; hence query equivalent = 10/3 = 3 minutes.

C.5 - C.8 Reduced Travel to Records Offices

Narrative

Presently the eleven State Offices are the only repository and source of complete status data. ALMRS will expand this to all state, District and Area Offices of the Bureau.

Proposed Automated System

Travel by records users will be reduced when users can go to the closest terminal location. In most cases, there will be no travel required.

Benefits Summary

The cost reduction algorithm for the difference between the present system and ALMRS follows.

C.9 - C.12 Initial Transfer of ALMRS Data and Updating Subscription Service

Algorithm

Cost and Benefit Data for Data Sharing

Cost		Townships	Cost/Township	Percentage
Coordinate Data	$19,000,000	45,862	$414.29	42.3
Alphanumeric Data[1/]	25,900,000	45,862	564.74	57.7
TOTAL	$44,900,000		$979.02	100.0

Program Allocation Based on Workload: Lands - 25 percent
Minerals - 75 percent

Computation of Program/Data Type Percentage

Program Data Type	Program Percent	Data Type Percent	Percent of Pgm/Data Combination	Cost and Benefit per Township	Per Township Benefit by Program and Data Type
Land Alphanumeric	.25	.58	.1450	$979	$141.95
Land Graphic	.25	.42	.1050	979	102.80
TOTAL LAND		100	.2500		$244.75
Mineral Alphanumeric	.75	.58	.4350	$979	$425.87
Mineral Graphic	.75	.42	.3150	979	308.38
TOTAL MINERAL		100	.7500		$734.25
TOTAL	100	100	100		$979.00
TOTAL ALPHANUMERIC					$567.82
TOTAL GRAPHIC					411.18

Initial Data Transfer of ALMRS data to Non-federal users:

17,000 Townships in (MT, WY, CO, NM, UT) plus .25 of remaining ALMRS Townships.
17,000 plus .25 (45,862 - 17,0000)
17,000 plus 7,215 = 24,215 Townships of ALMRS data, coordinate and alphanumeric plus .25 x (45,862 - 24,215) = 5,412 townships, alphanumeric only.

Algorithms	Program and Data Type	Number of Townships	Benefit/Twp by Origin Pgm/Data	Benefit One Time
C.9	Land: Alphanumeric	29,627	$141.95/Township	$4,205,553
C.10	Graphic	24,215	102.80/Township	2,489,302
	TOTAL LAND		$244.75	$6,694,855
C.11	Mineral: Alphanumeric	29,627	$425.87/Township	$12,617,250
C.12	Graphic	24,215	308.38/Township	7,467,422
	TOTAL MINERAL		$734.25	$20,084,672
	TOTAL		$979.00	$26,779,527

[1/] Examples: Status, Land Description, Regulations, Stipulations, Master Names

C.13 - C.16 Update Subscription for ALMRS Data to Non-federal Users

Narrative

ALMRS will provide data updates to those non-federal users who have subscribed to the service and have acquired the initial data from BLM. The updating service will allow users outside the federal government to make decisions using the most current land status information.

Personnel Functions:

- Bureau personnel will produce magnetic media copies of updates of ALMRS spatial and alphanumeric data.

Present Manual System

At present, no such service is provided by the Bureau.

Proposed Automated System

With an automated system, ALMRS data (legal land description, status) and the geographic coordinates from the Cadastral Survey Geographic Coordinates (topologically structured) and alphanumeric status data will be available through an updating service to other federal agencies.

It is anticipated that non-federal ALMRS data users will annually update approximately 50% of data initially received from ALMRS.

Benefits Summary

Both the federal government and the non-federal users will benefit from nonduplication of acquiring spatial and alphanumeric data and have easy transfers of data from one system to another and standardization of data among State and local governments, non-federal users, and federal users.

C.13 - C.16 Update Subscription for ALMRS Data to Non-Federal Users

The annual benefit to non-federal users for annual update data transfer to their systems will be 50 percent of the initial data costs of the data and cover the 24,215 townships per year.

Algorithm

Data	Benefit Per Township Initial Data Transfer	Annual Benefit Percent of Initial	Annual Benefit	Number of Townships	Benefi Per Yea
C.13 Land Alphanumeric	$141.95	.50	$ 70.98	29,627	$2,102,9
C.14 Land Graphic	102.80	.50	51.40	24,215	1,244,6
TOTAL LAND	$244.75		$112.38		$3,347,5
C.15 Mineral Alphanumeric	$425.87	.50	$212.93	29,627	$6,308,4
C.16 Mineral Graphic	308.38	.50	154.19	24,215	3,733,7
TOTAL MINERAL	$734.25		$367.12		$10,042,1
TOTAL	$979.00	.50	$489.50	24,215	$13,389,7

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